Draft Feasibility Report
Dam Feasibility and Impact Analysis

Macallen Dam, Newmarket, NH

Volume 2 of 2: Figures, Larger Tables and Appendices

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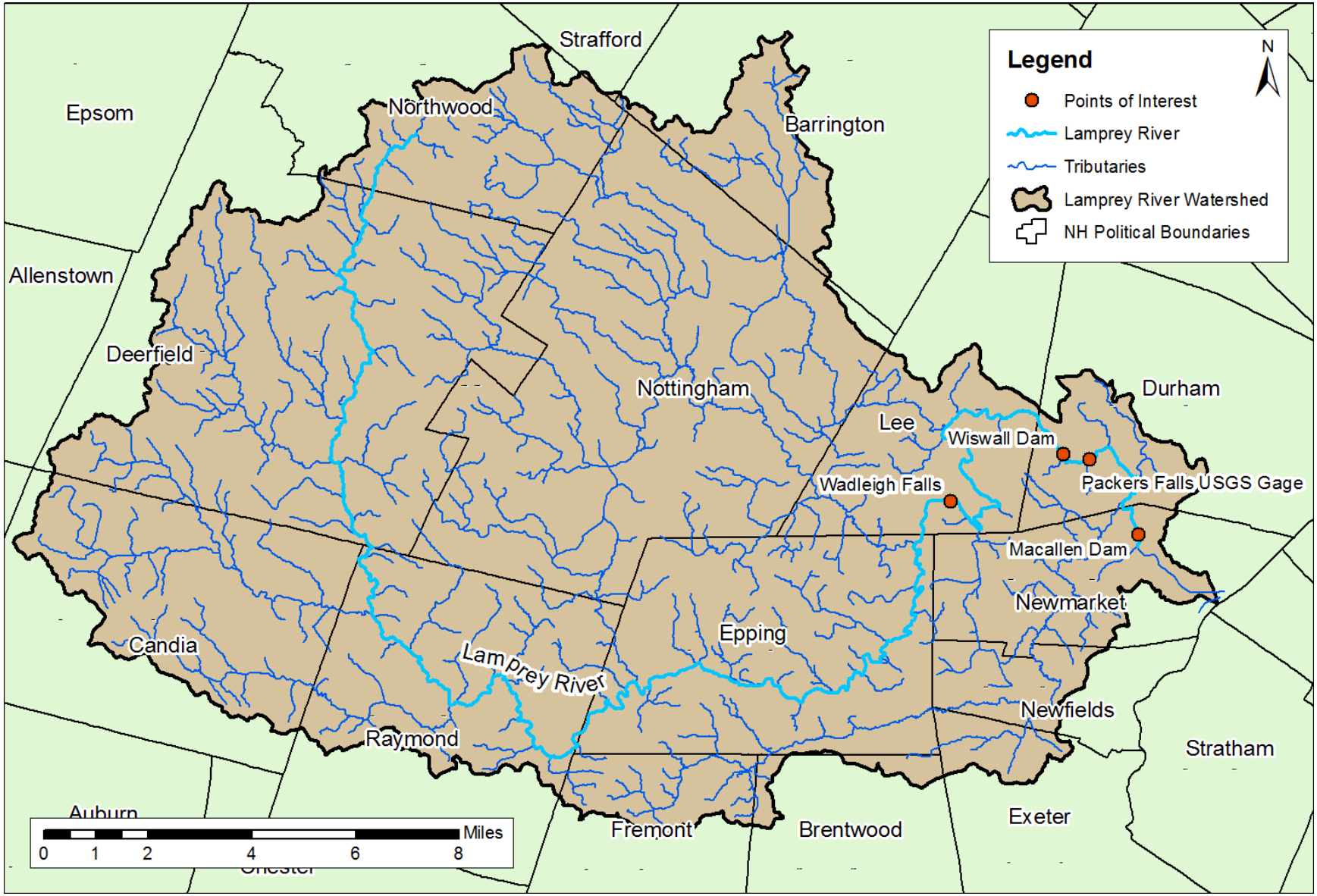

Figure 1.1-1: Lamprey River Watershed and Points of Interest

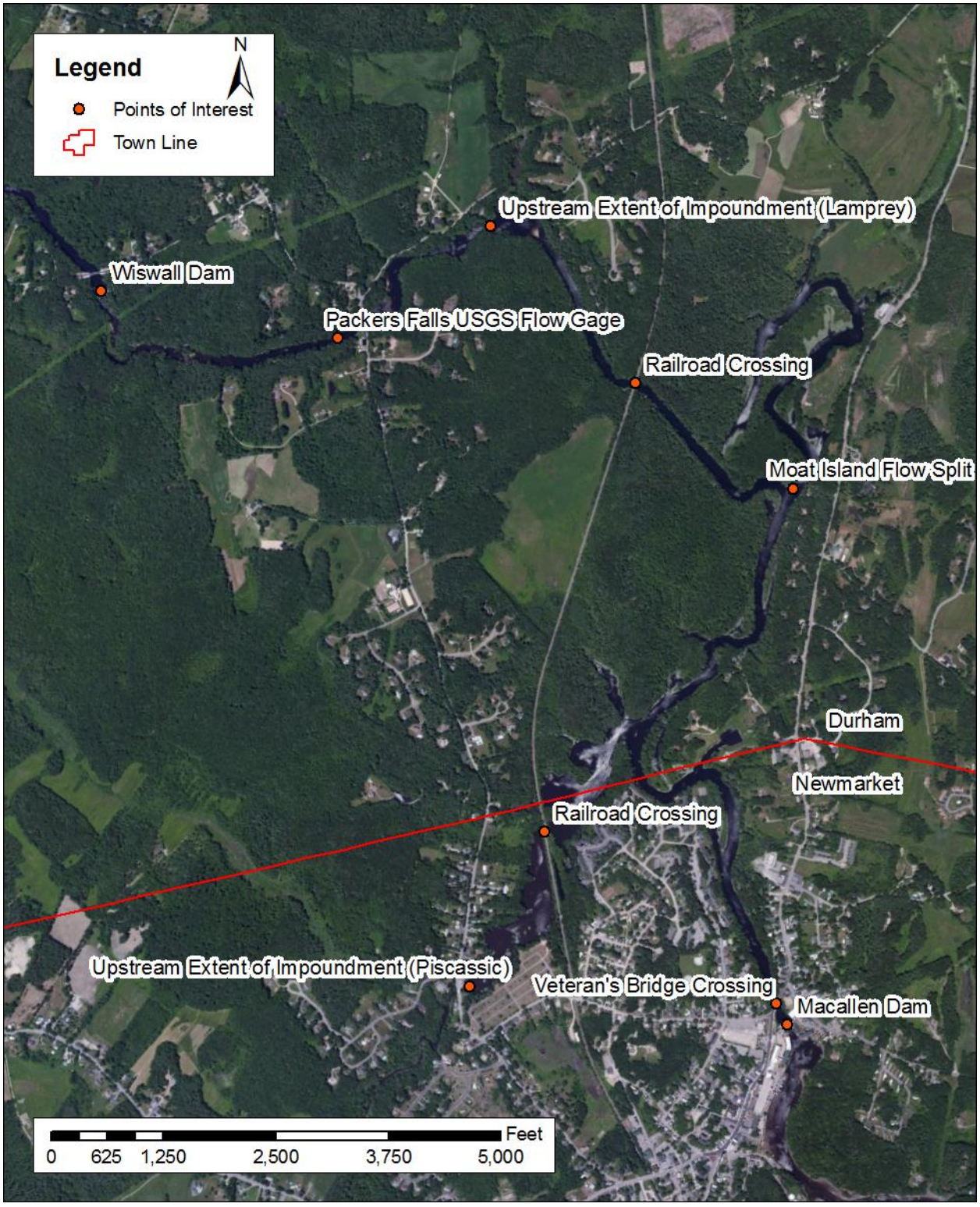

Figure 2.1-1: Dam and Impoundment Overview

Figure 2.1-2: Aerial close-up of Macallen Dam

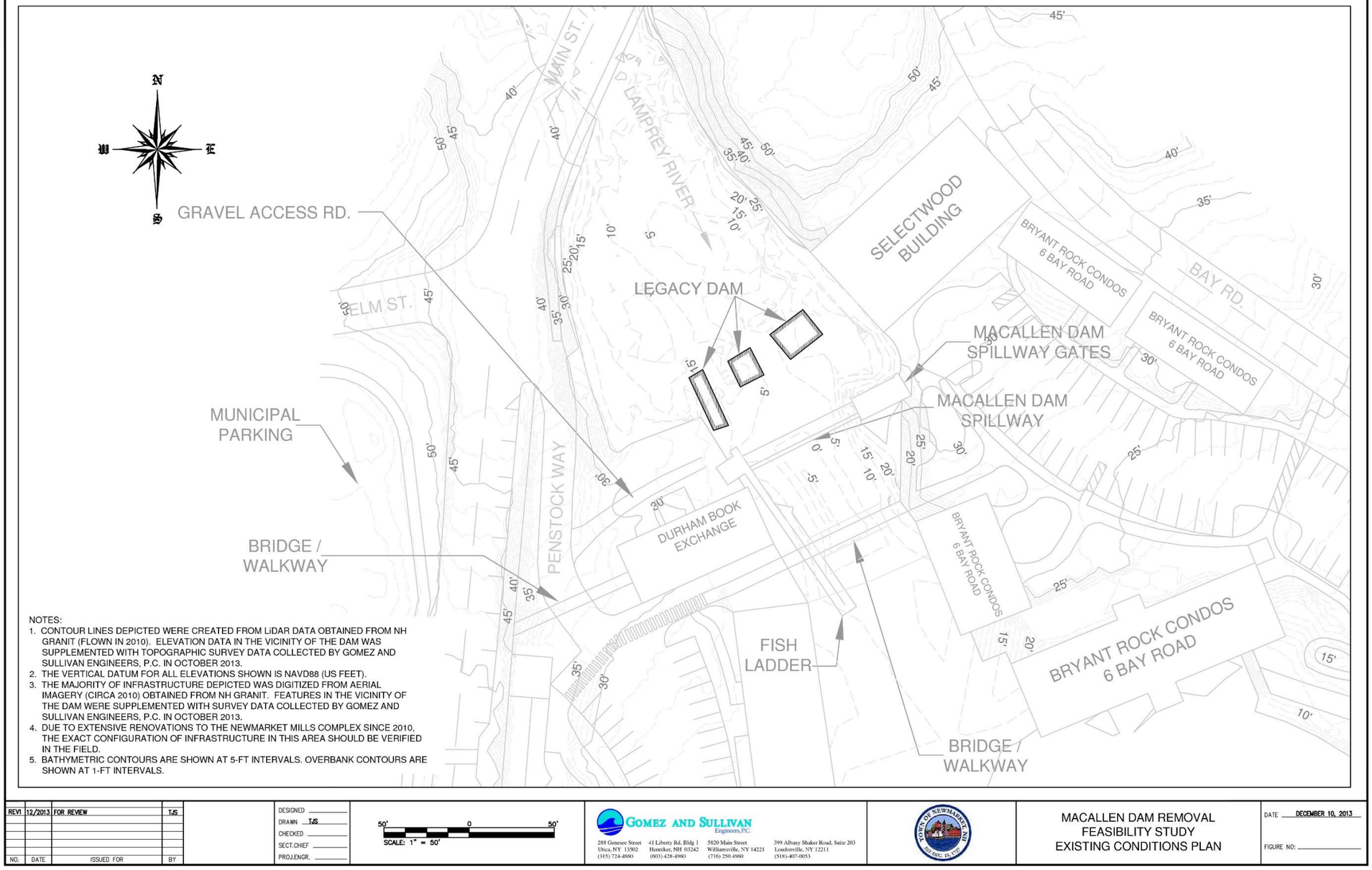

Figure 2.1-3: Existing Conditions Base Map of Macallen Dam

Figure 2.2-1: Looking downstream toward Macallen Dam's left abutment, right abutment and spillway sections. Photo taken July 2012.

Figure 2.2-2: Photo of the dam's right abutment and spillway sections, including geometry of the sloped upstream face of the dam. Photo taken during the October 2013 drawdown. Note the metal lip running along the center of the spillway crest.

Figure 2.2-3: Left abutment and crest gates. Photo taken during the October 2013 drawdown.

Figure 2.2-4: Macallen Dam during the March 16, 2010 flood event. Flow is approximately 6,710 cfs. Photo is taken from the right abutment, looking toward the spillway and left abutment. Photo source: NHDES Dam Bureau.

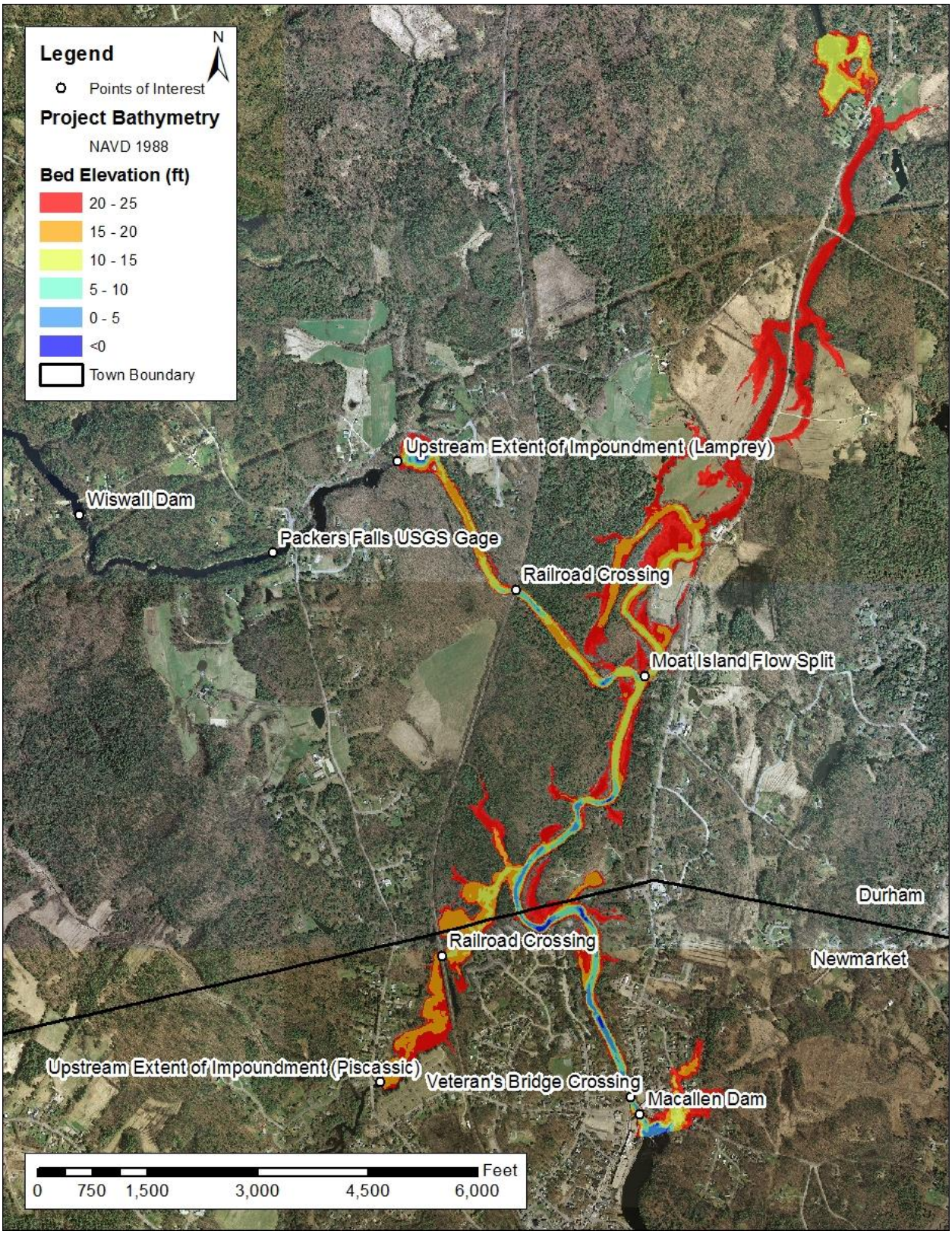

Figure 4.2-1: Bathymetric map of the Macallen Dam impoundment and surrounding areas.

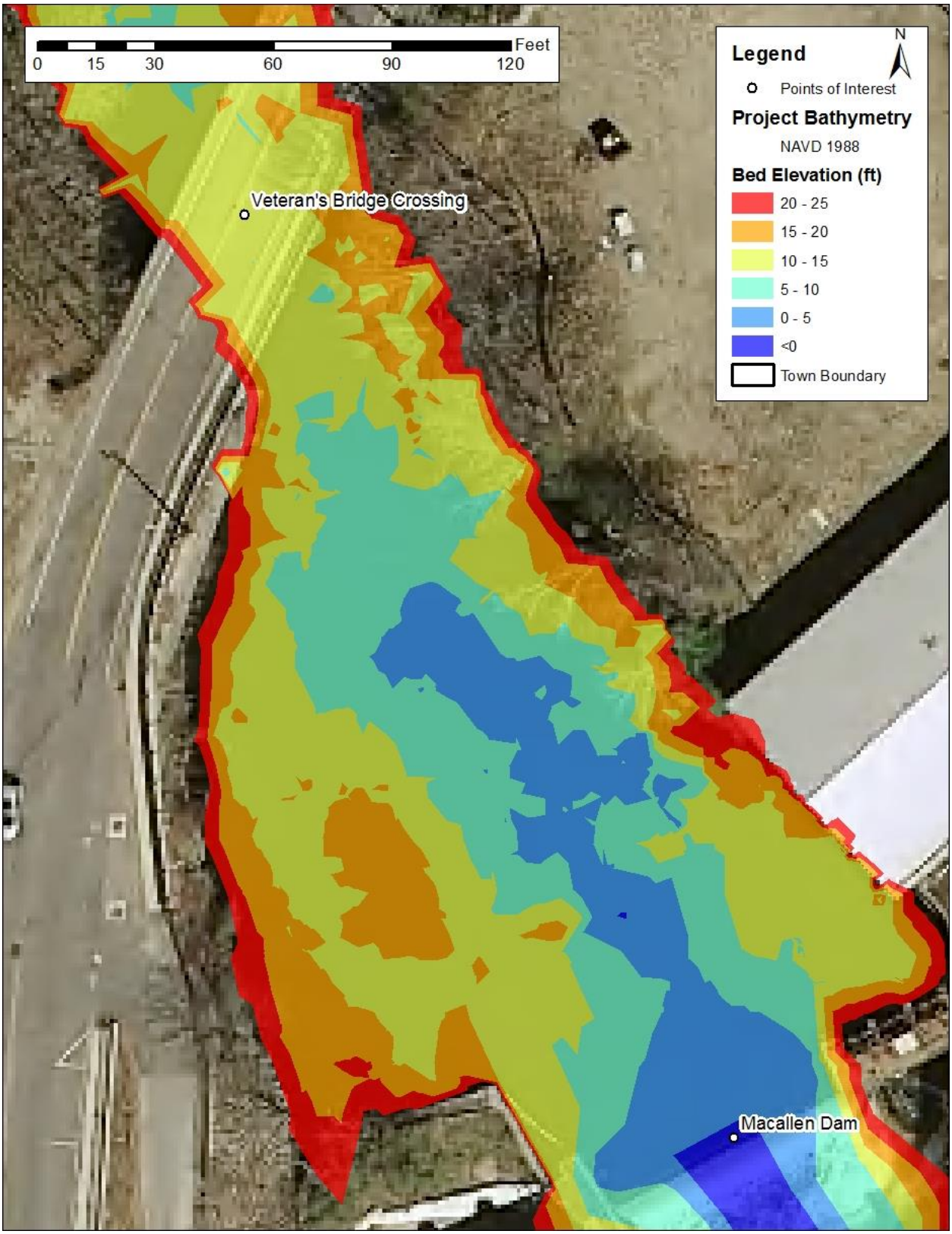

Figure 4.2-2: Bathymetric Map between Veterans Bridge and Macallen Dam.

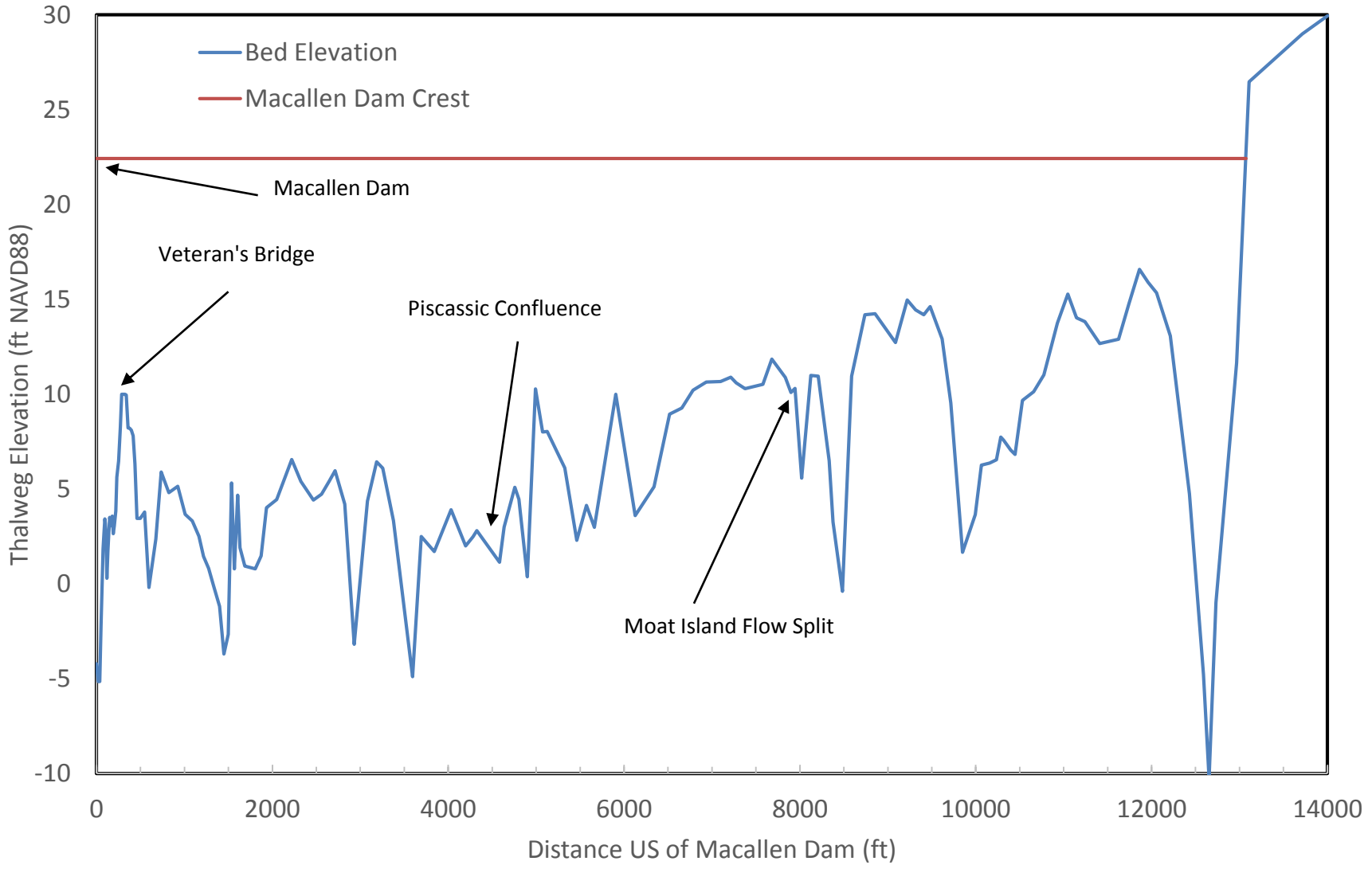

Figure 4.2-3: Lamprey River Channel Bed Profile (note that the bed elevation is of the thalweg or lowest point along the river profile).

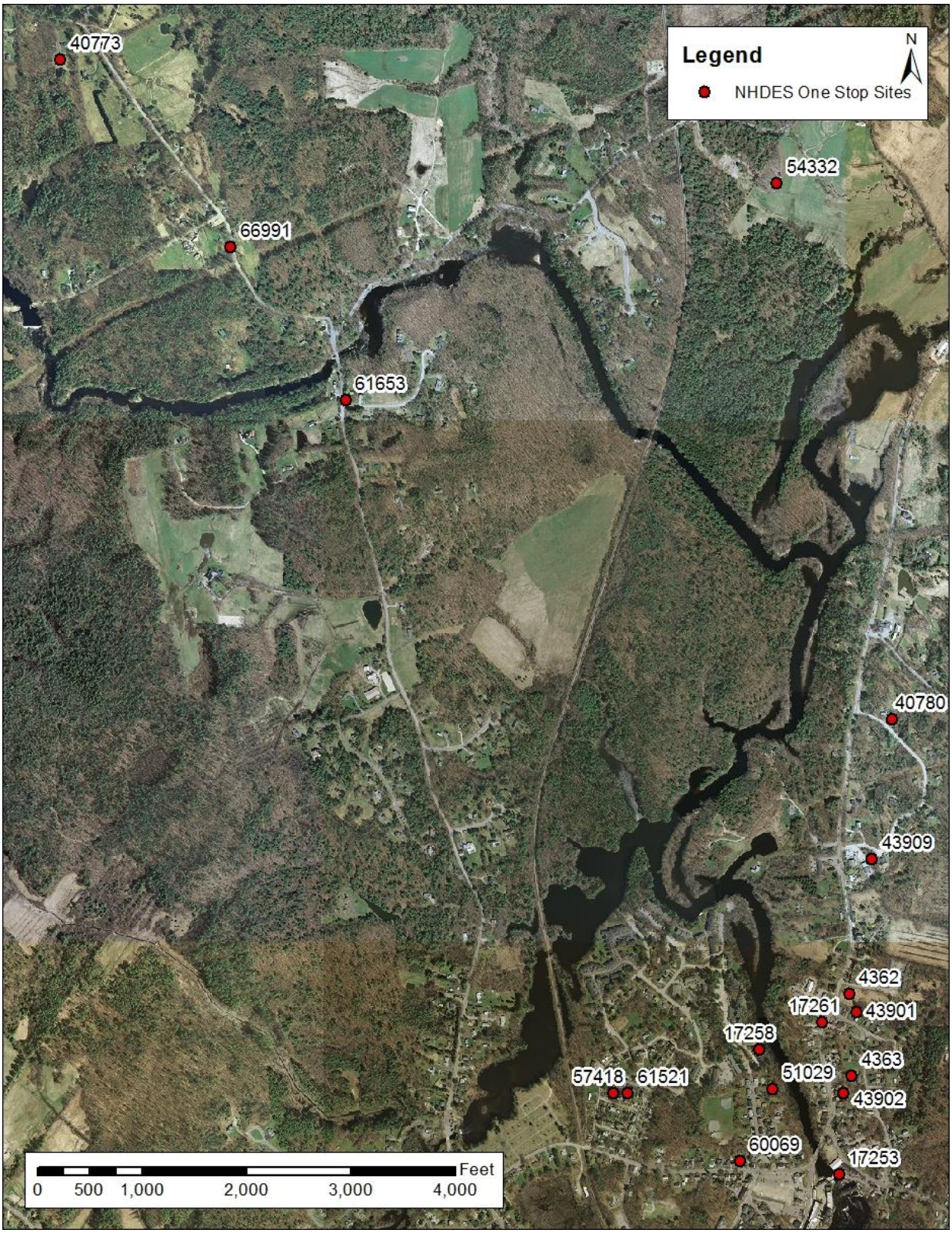

Figure 5.2.1-1: Location of Spills Recorded on NHDES One-Stop in Proximity to the Project, with Master ID displayed for each site.

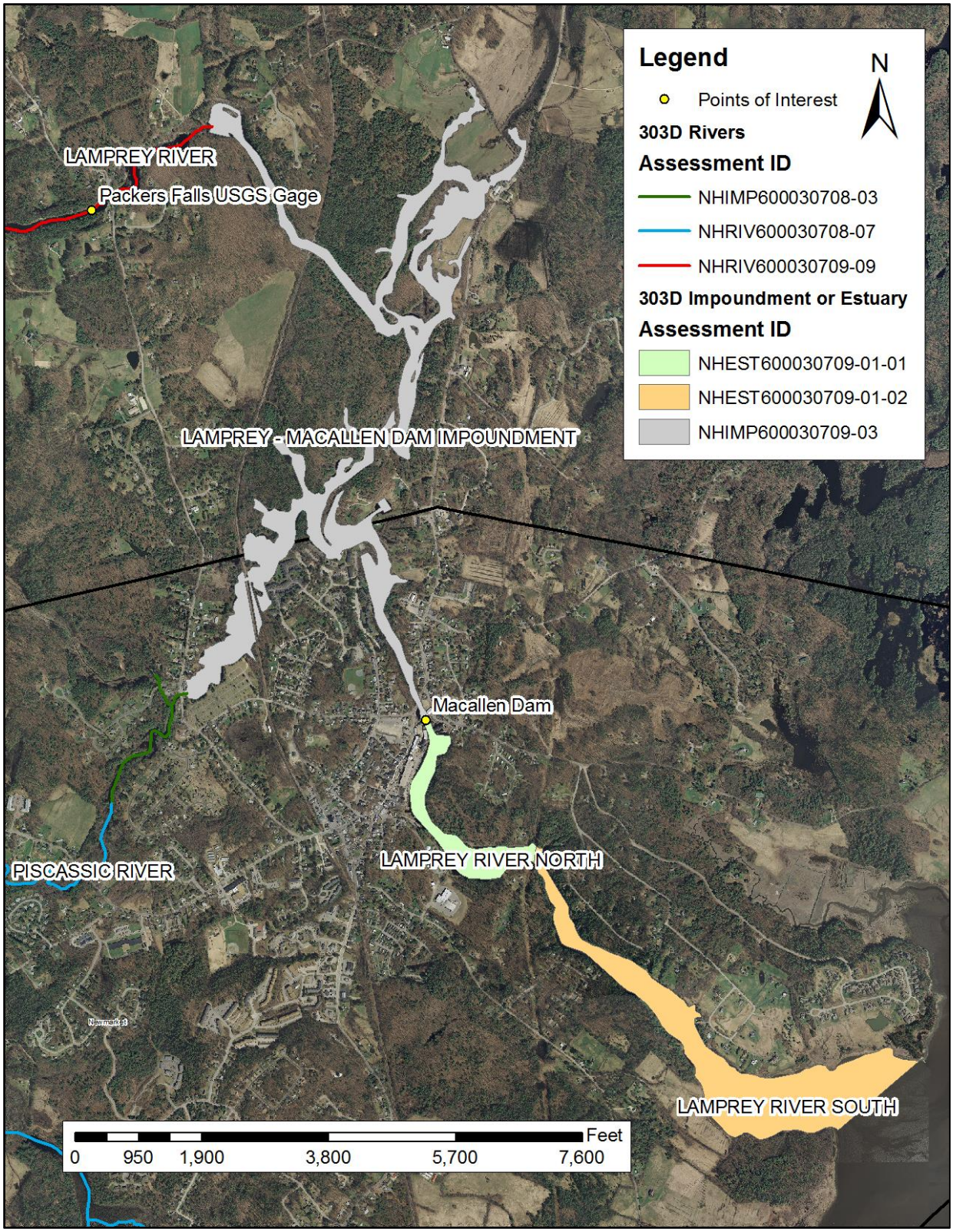

Figure 5.2.1-2: NH 2012 303(d) Assessment Segments

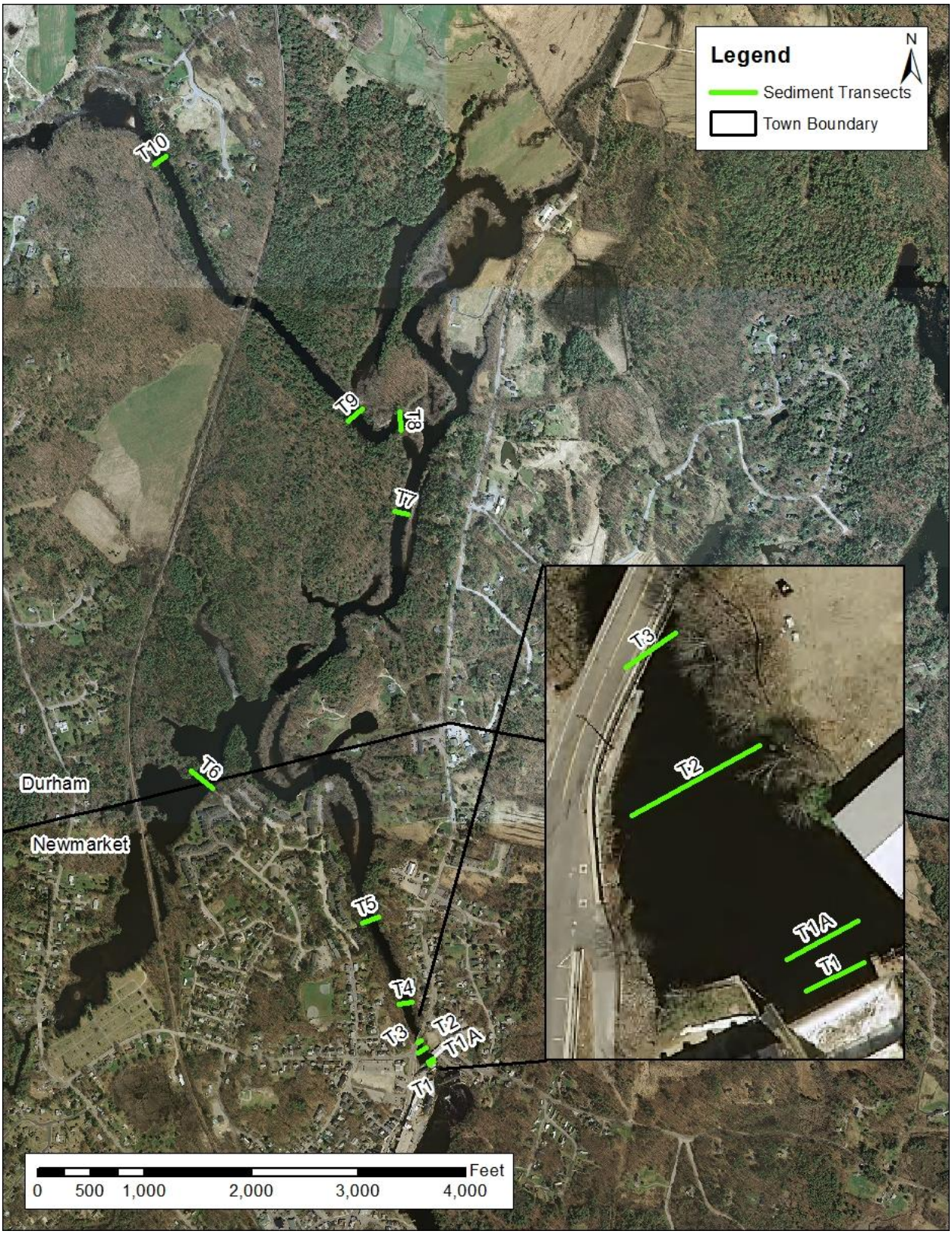

Figure 5.3.2-1: Plan Map of Sediment Thickness Transects.

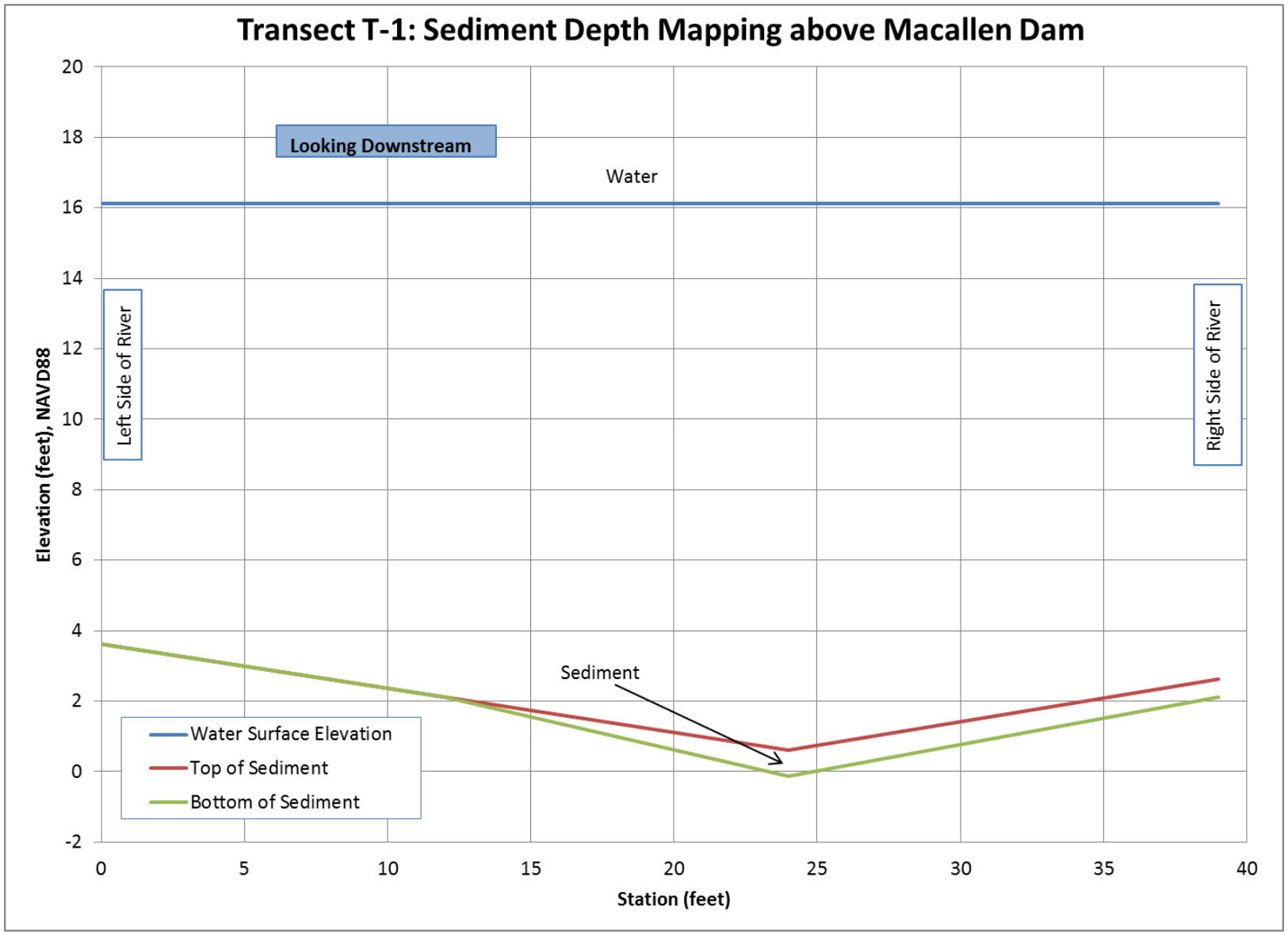

Figure 5.3.2-2: Transect T-1 Sediment Thickness, Lamprey River

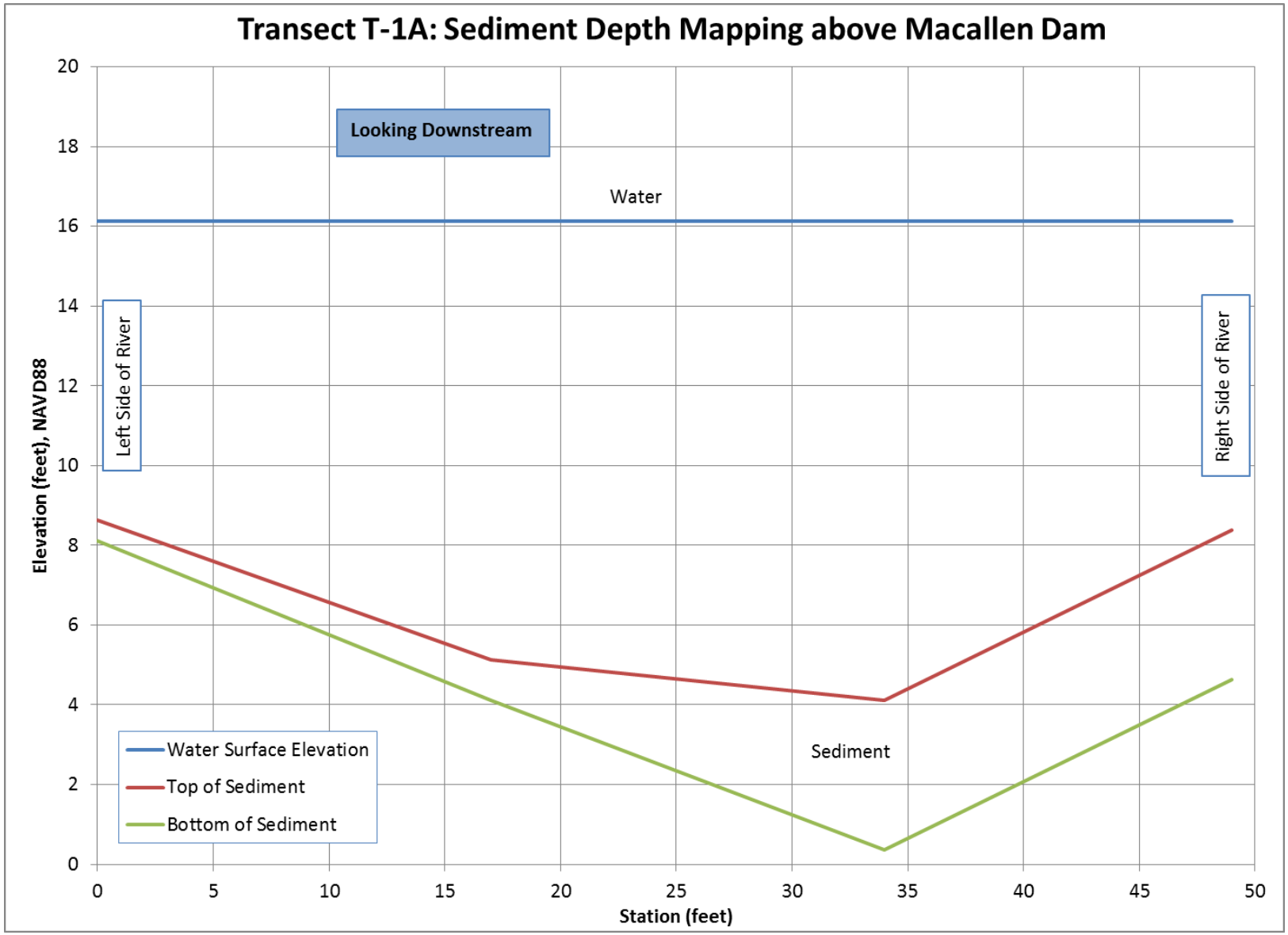

Figure 5.3.2-3: Transect T-1A Sediment Thickness, Lamprey River

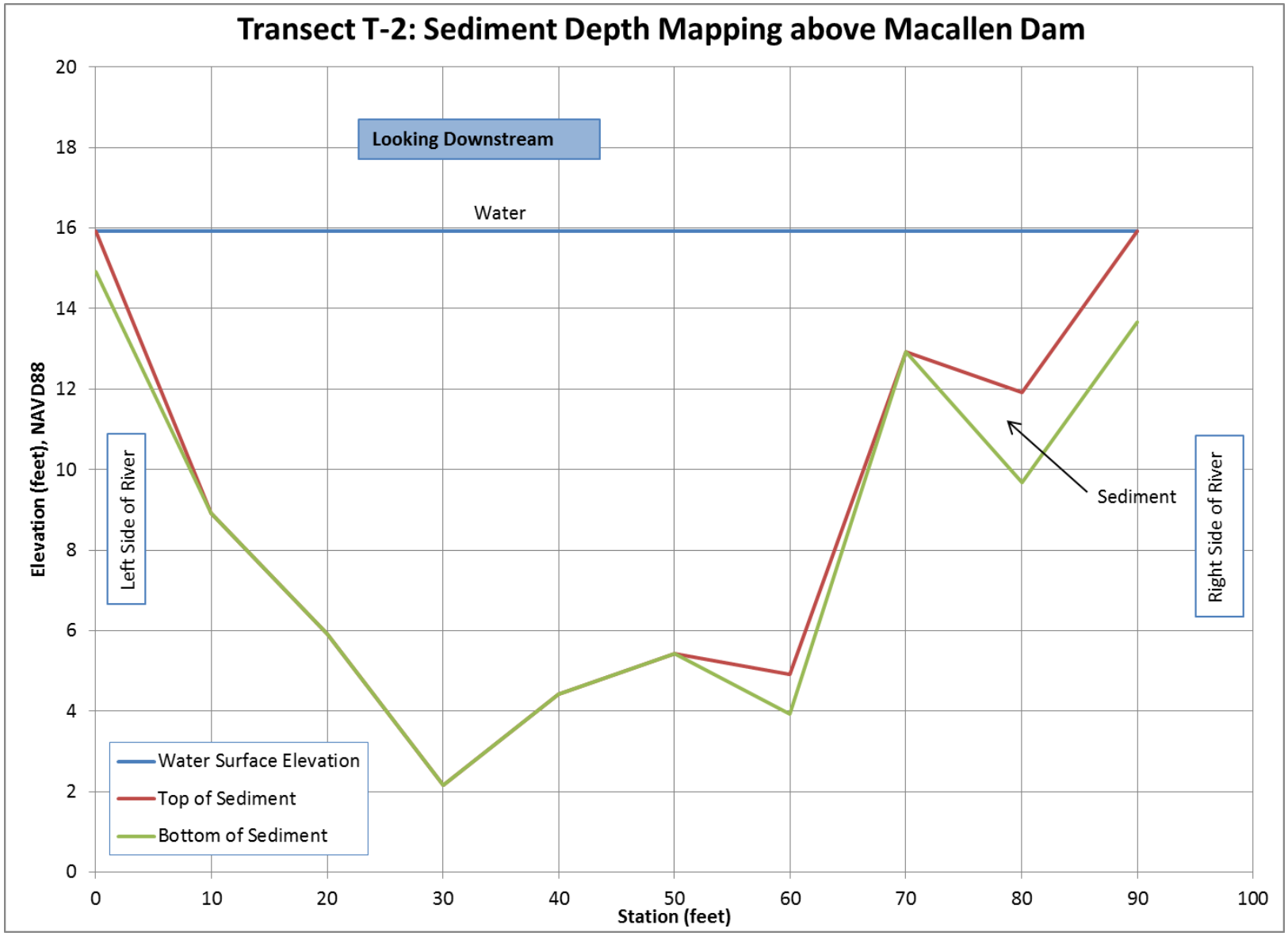

Figure 5.3.2-4: Transect T-2 Sediment Thickness, Lamprey River

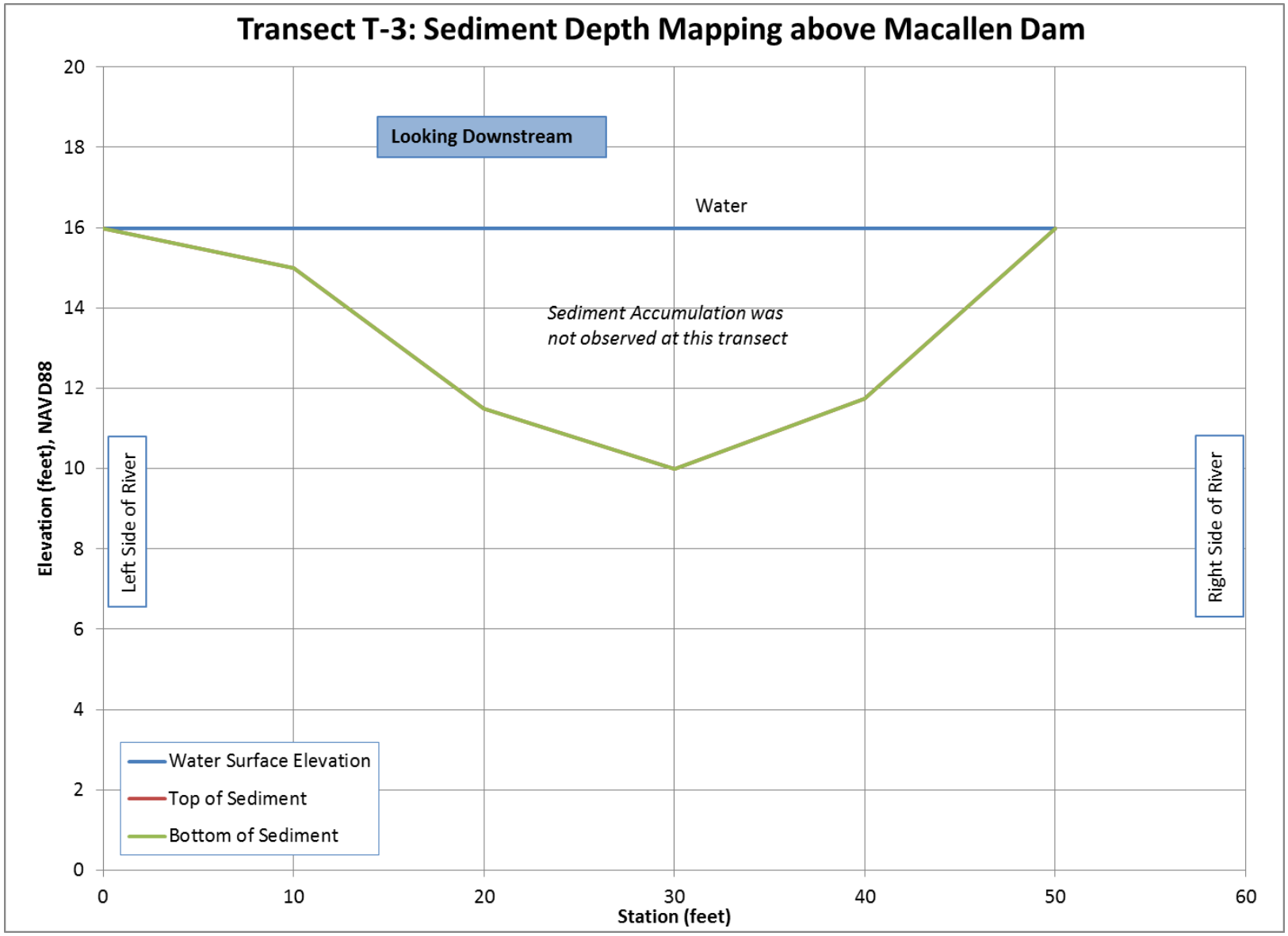

Figure 5.3.2-5: Transect T-3 Sediment Thickness, Lamprey River

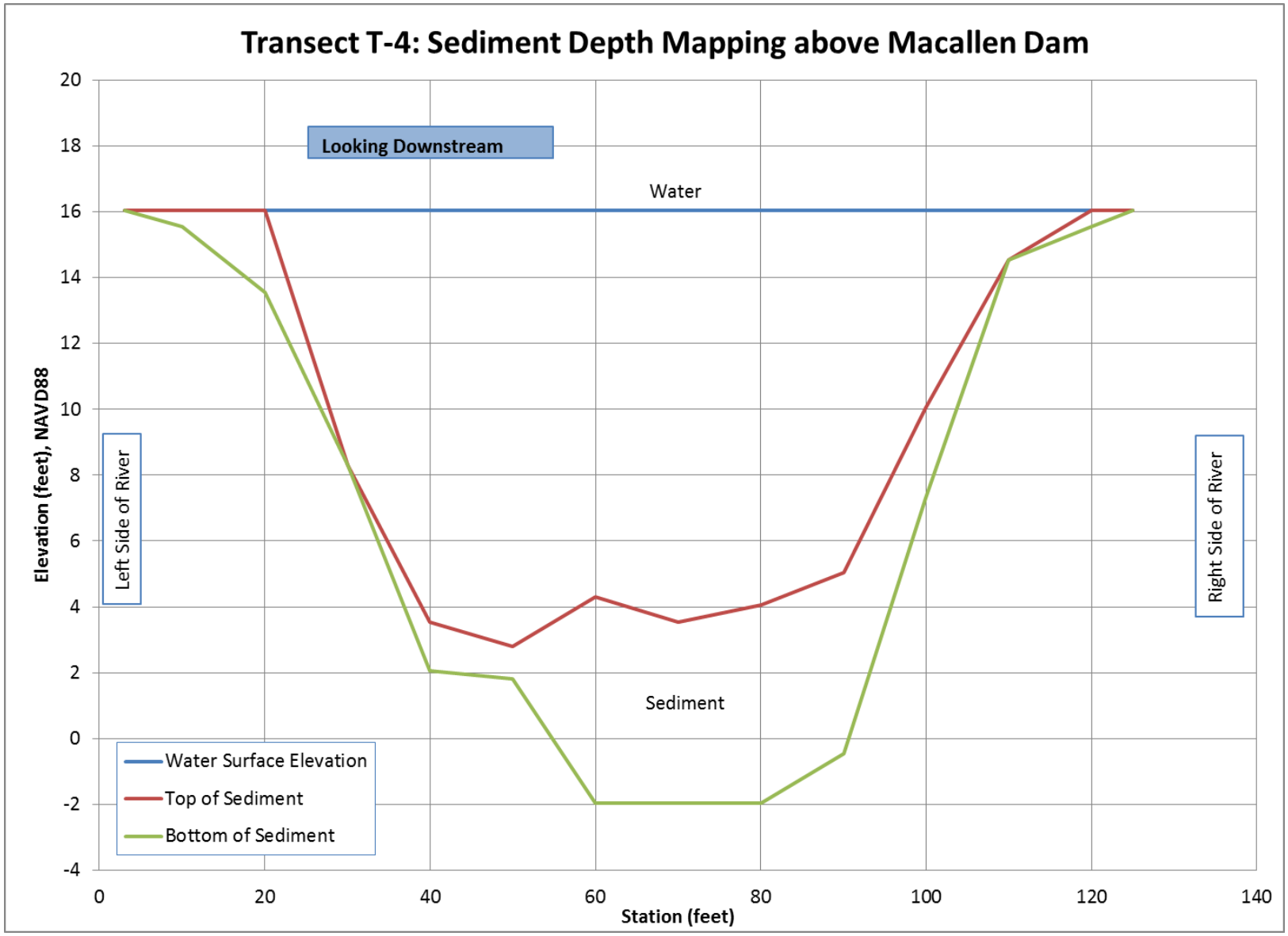

Figure 5.3.2-6: Transect T-4 Sediment Thickness, Lamprey River

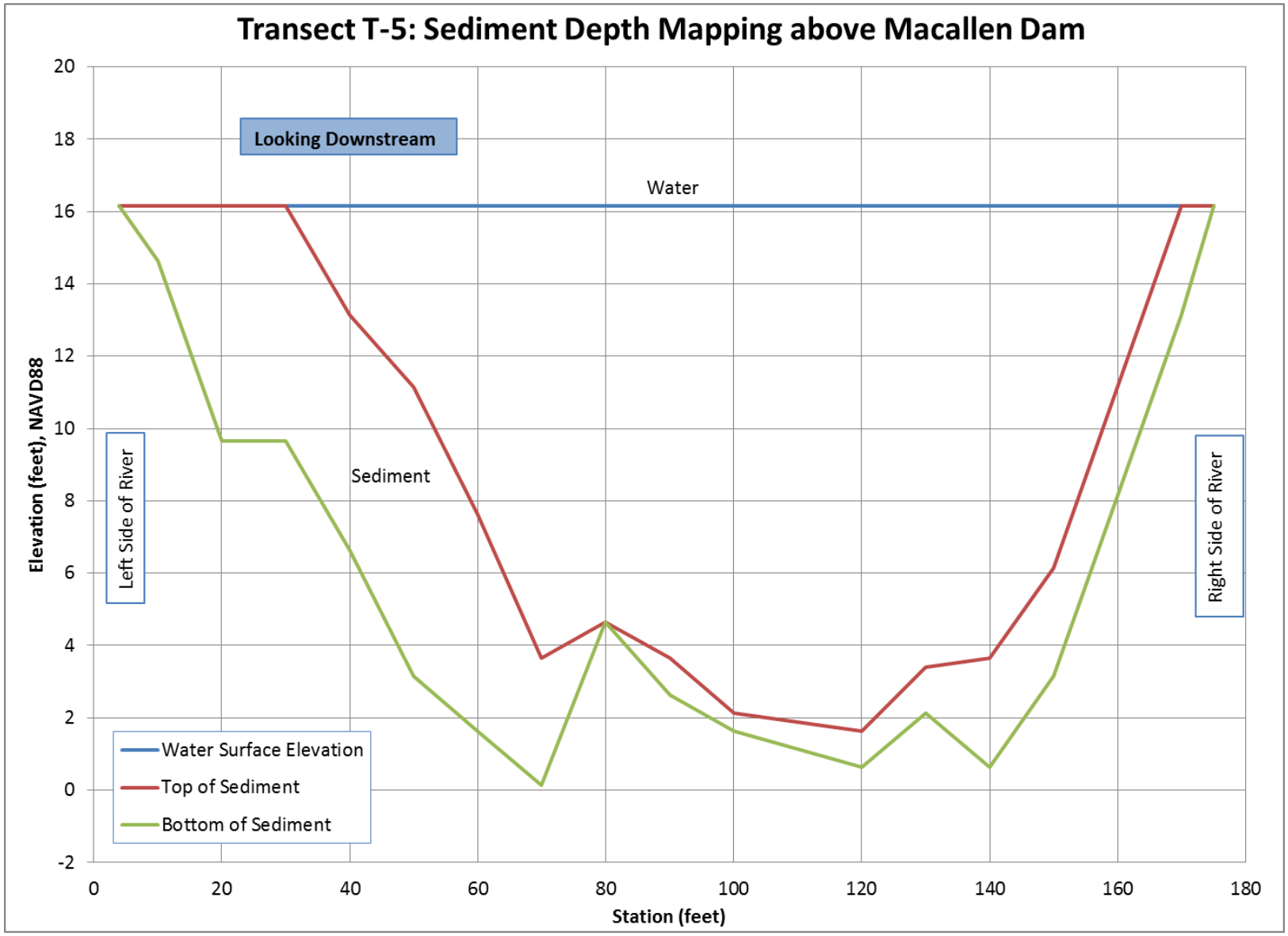

Figure 5.3.2-7: Transect T-5 Sediment Thickness, Lamprey River

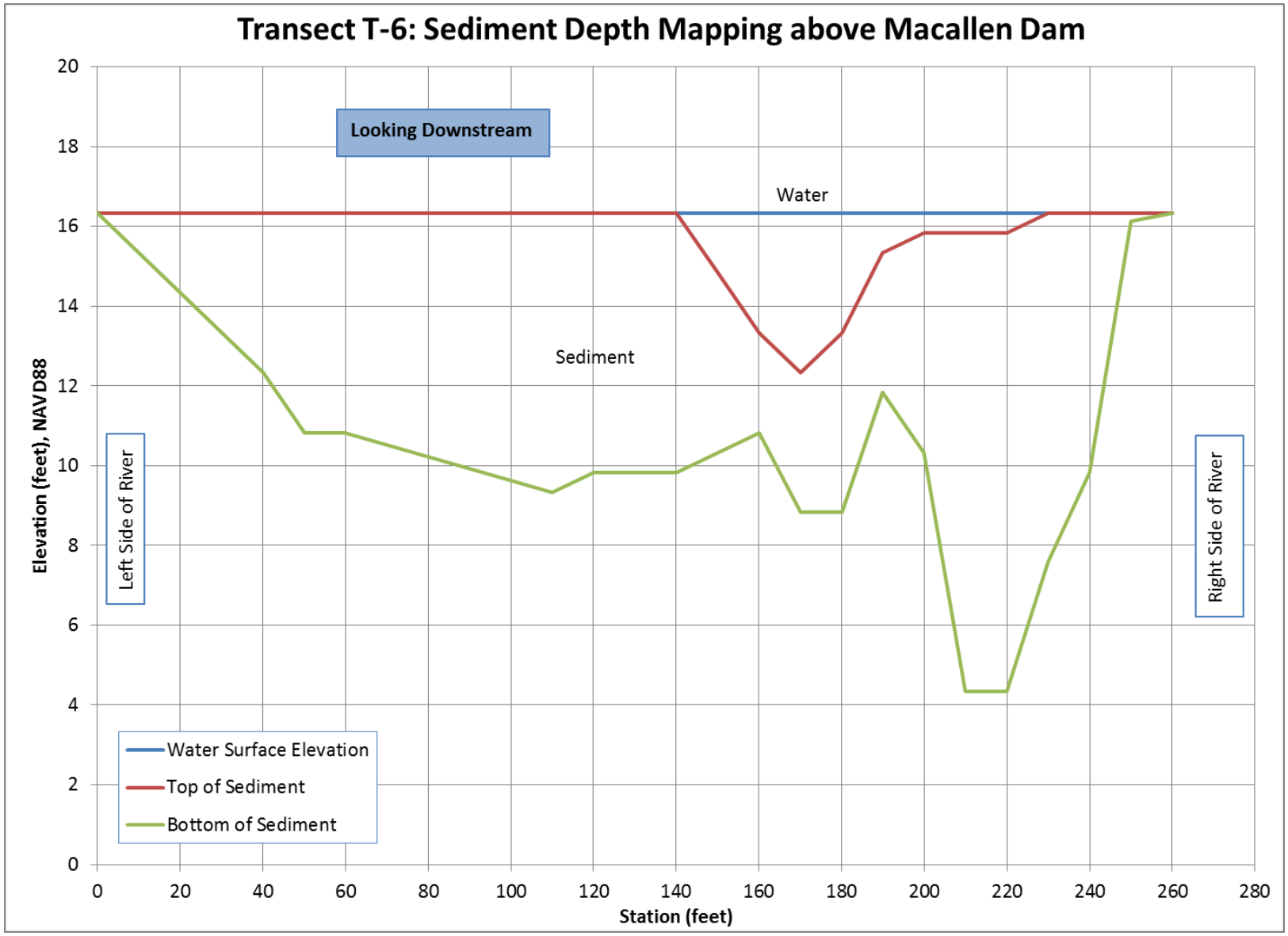

Figure 5.3.2-8: Transect T-6 Sediment Thickness, Piscassic River

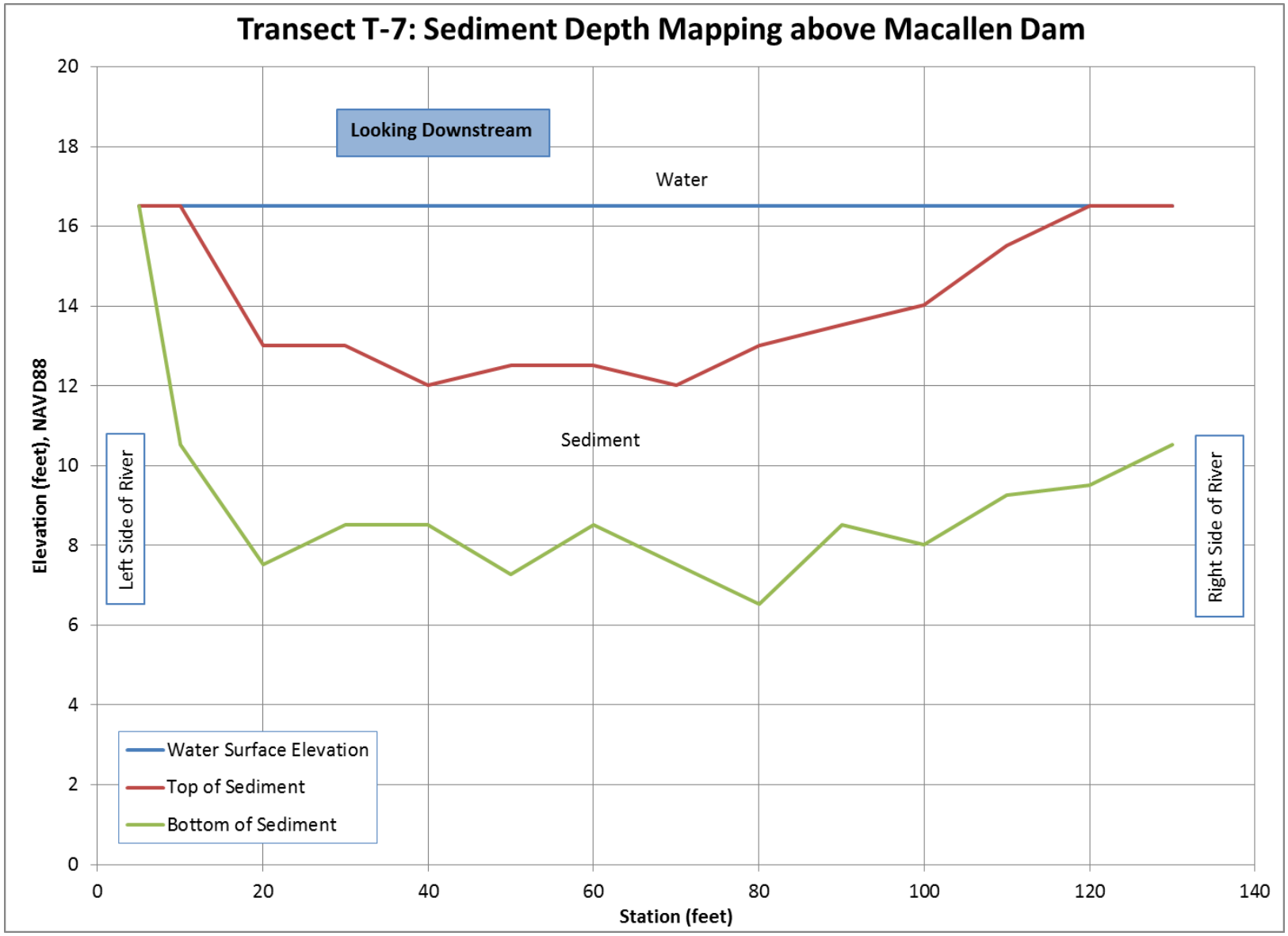

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Figure 5.3.2-9: Transect T-7 Sediment Thickness, Lamprey River

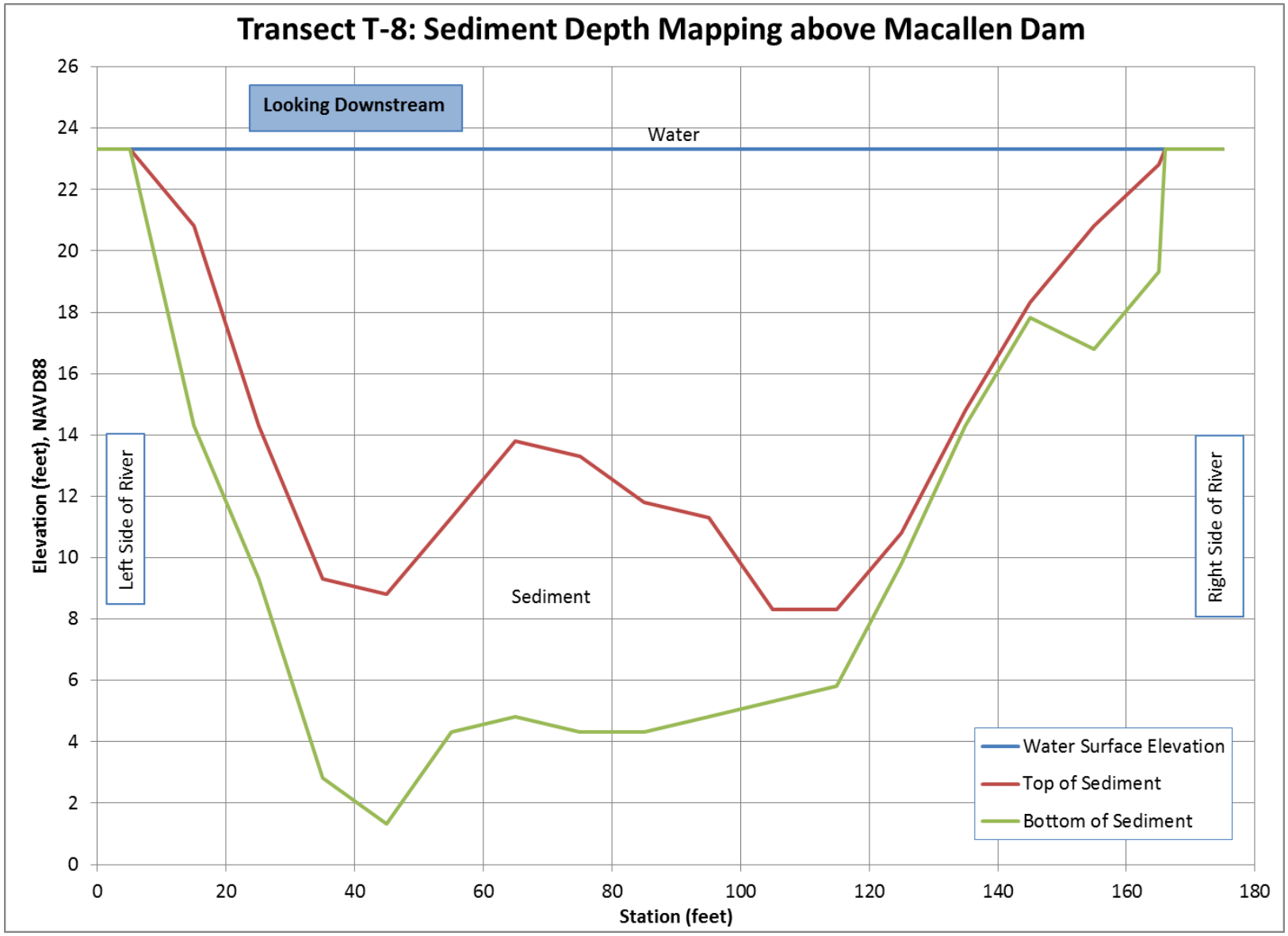

Figure 5.3.2-10: Transect T-8 Sediment Thickness, Lamprey River

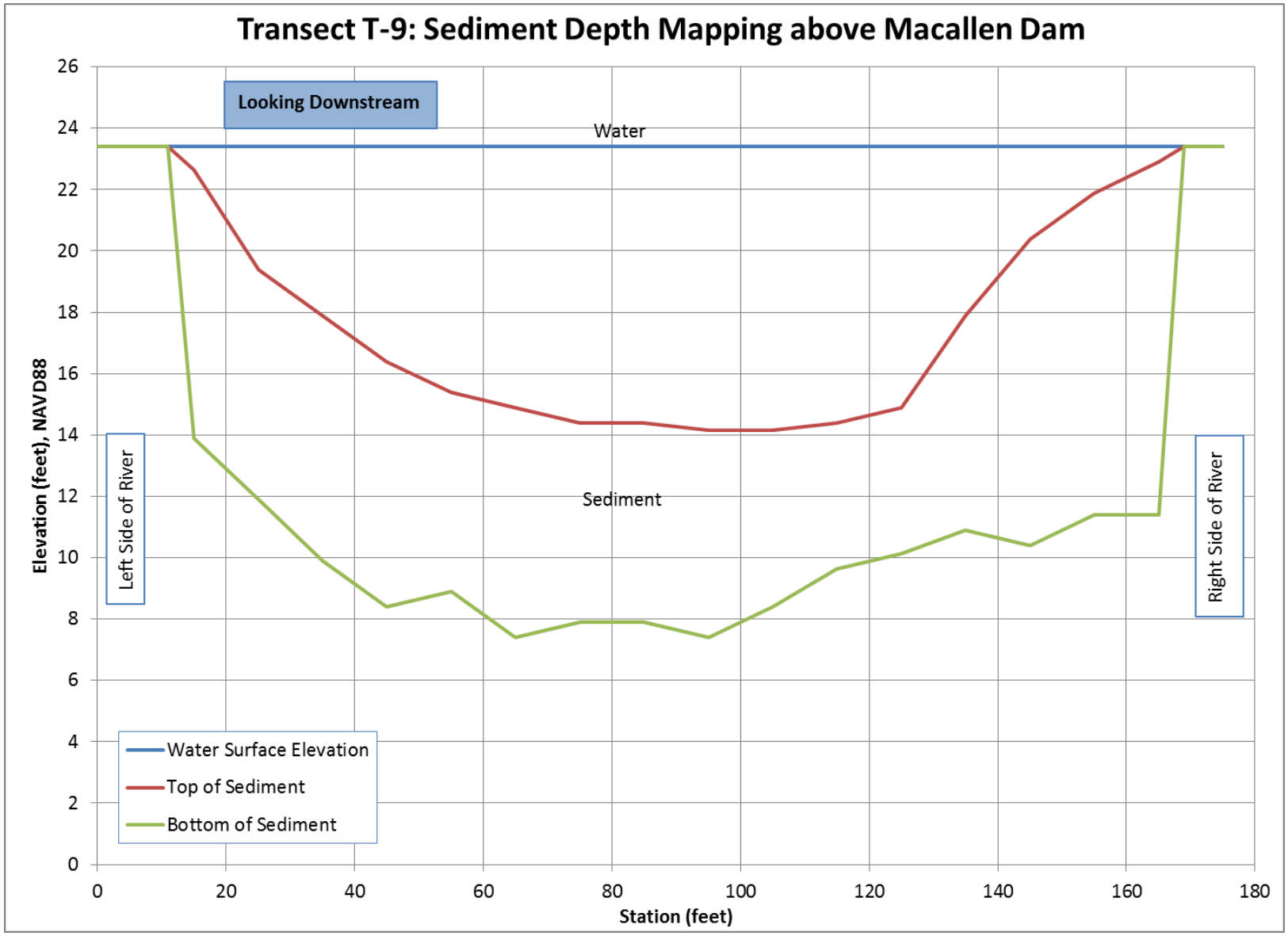

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Figure 5.3.2-11: Transect T-9 Sediment Thickness, Lamprey River

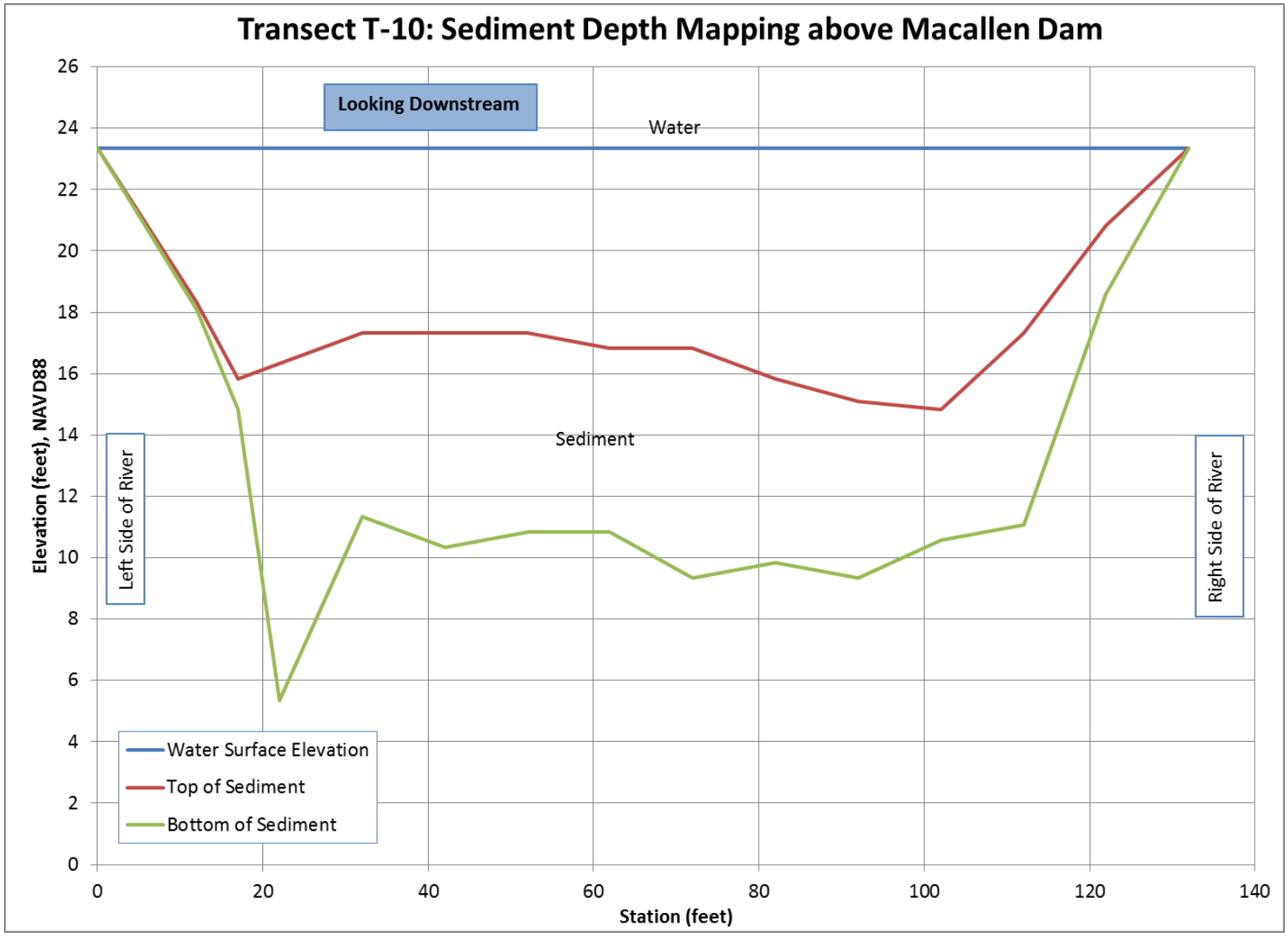

Figure 5.3.2-12: Transect T-10 Sediment Thickness, Lamprey River

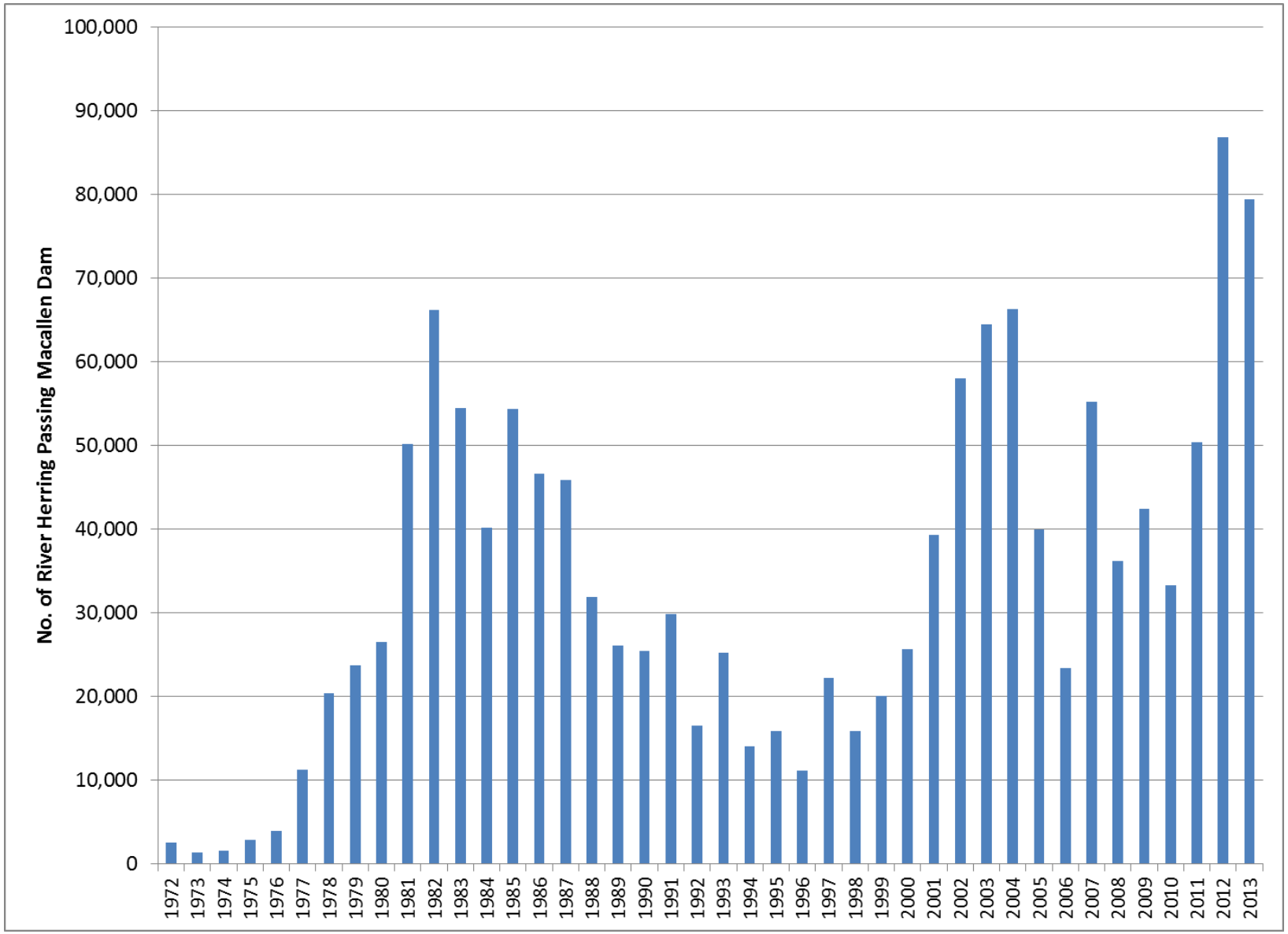

Figure 6.1.1-1: Total Annual Number of River Herring Passing Macallen Dam from 1972-2013 (Source; NHFGD, Oct 2013)

Figure 6.2.3-1: Aerial View of Macallen Dam's Former Hydroelectric Works

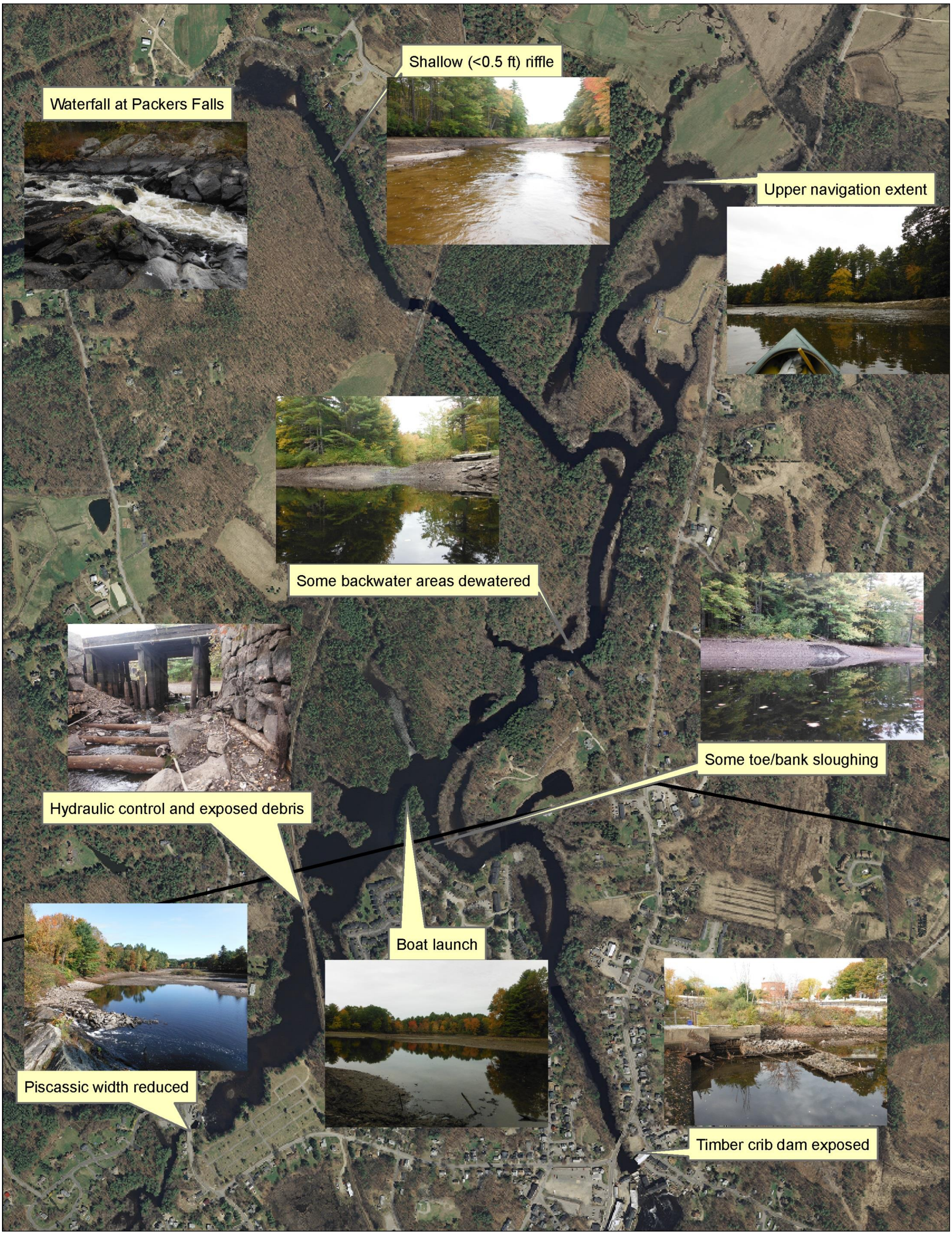

Figure 6.3-1: Aerial Map and Ground Photographs taken during October 2013 drawdown

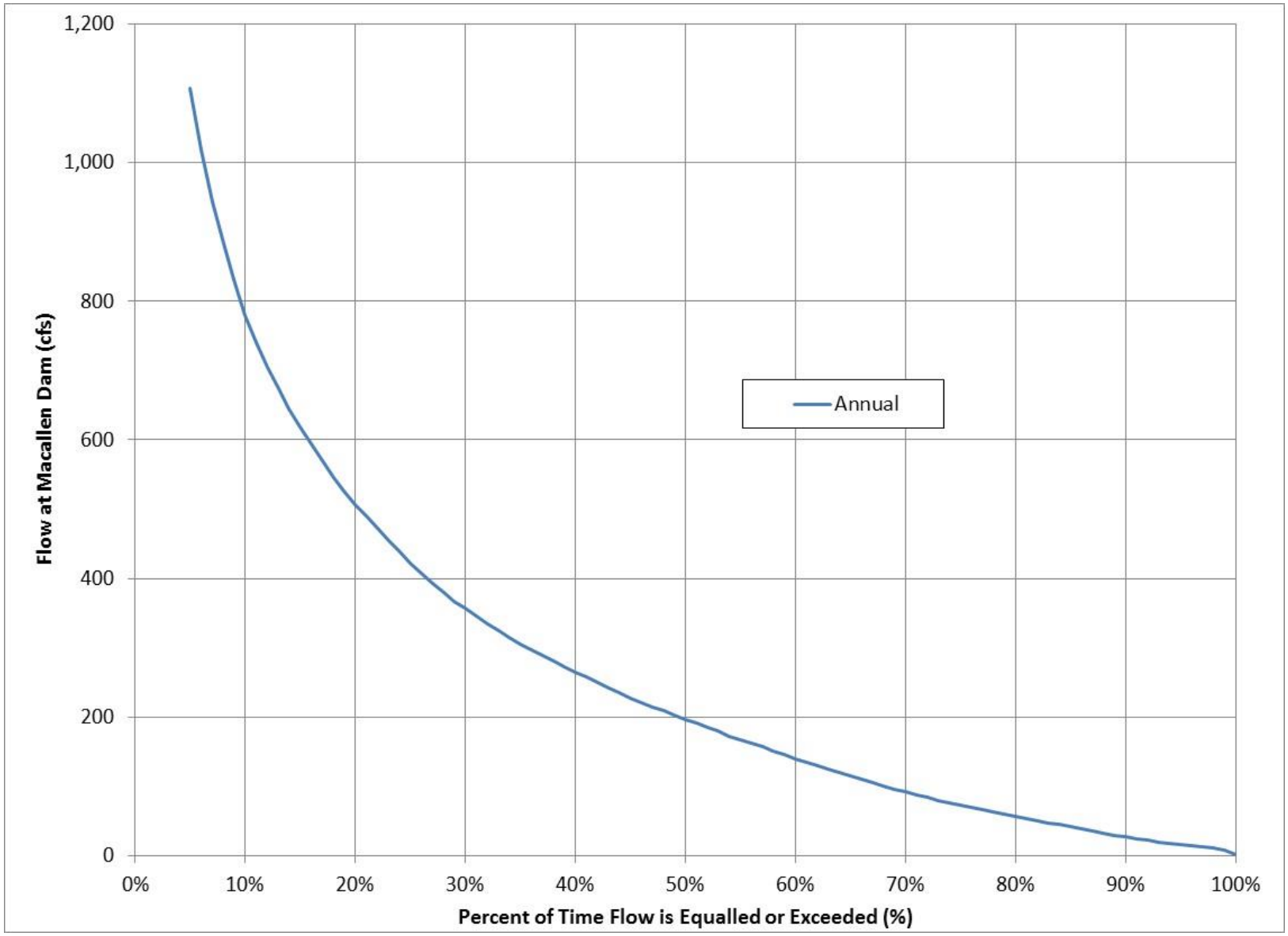

Figure 7.1-1 Annual Flow Duration Curve of Lamprey River at Macallen Dam.

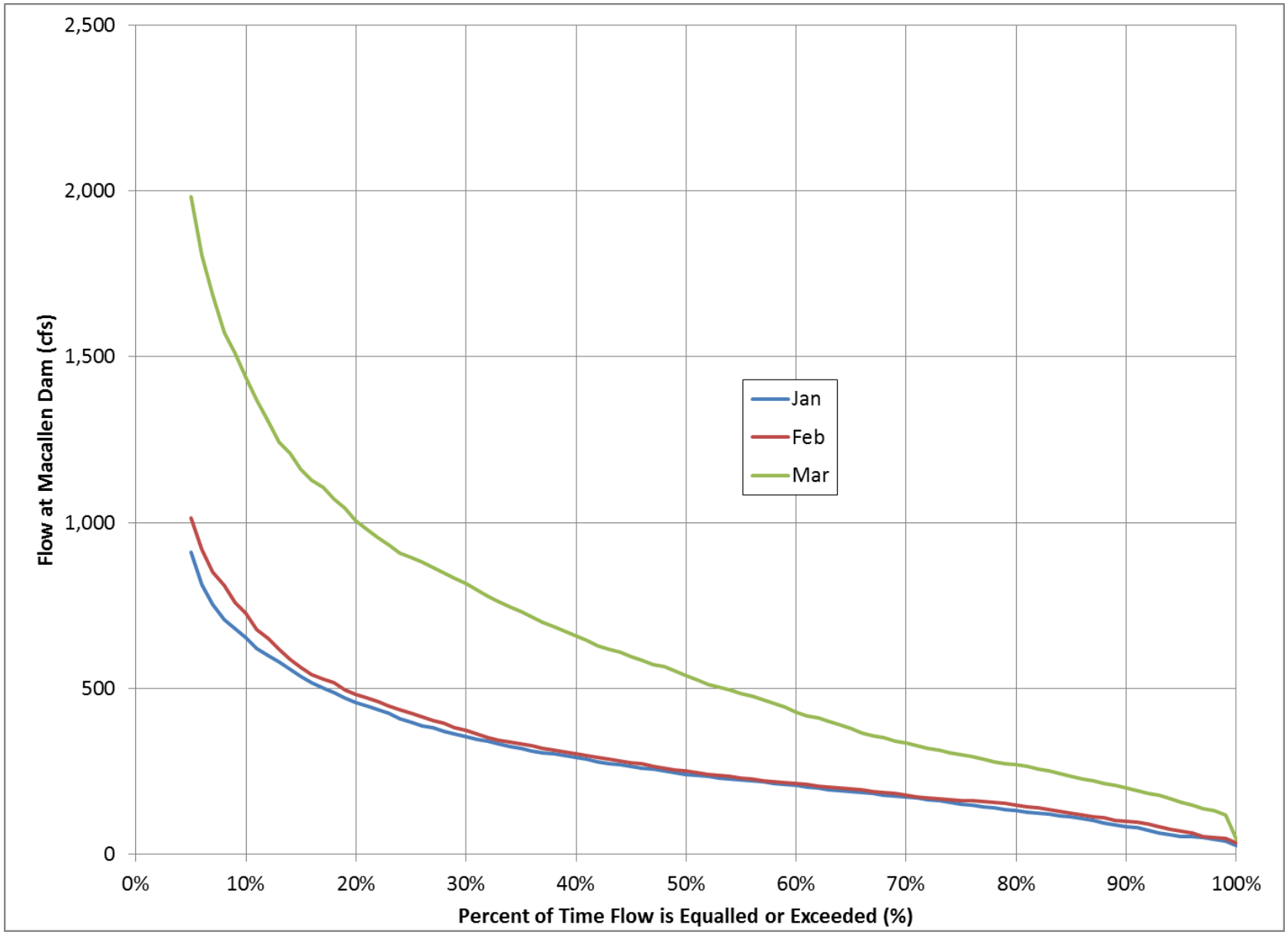

Figure 7.1-2 January, February, and March Flow Duration Curves of the Lamprey River at Macallen Dam.

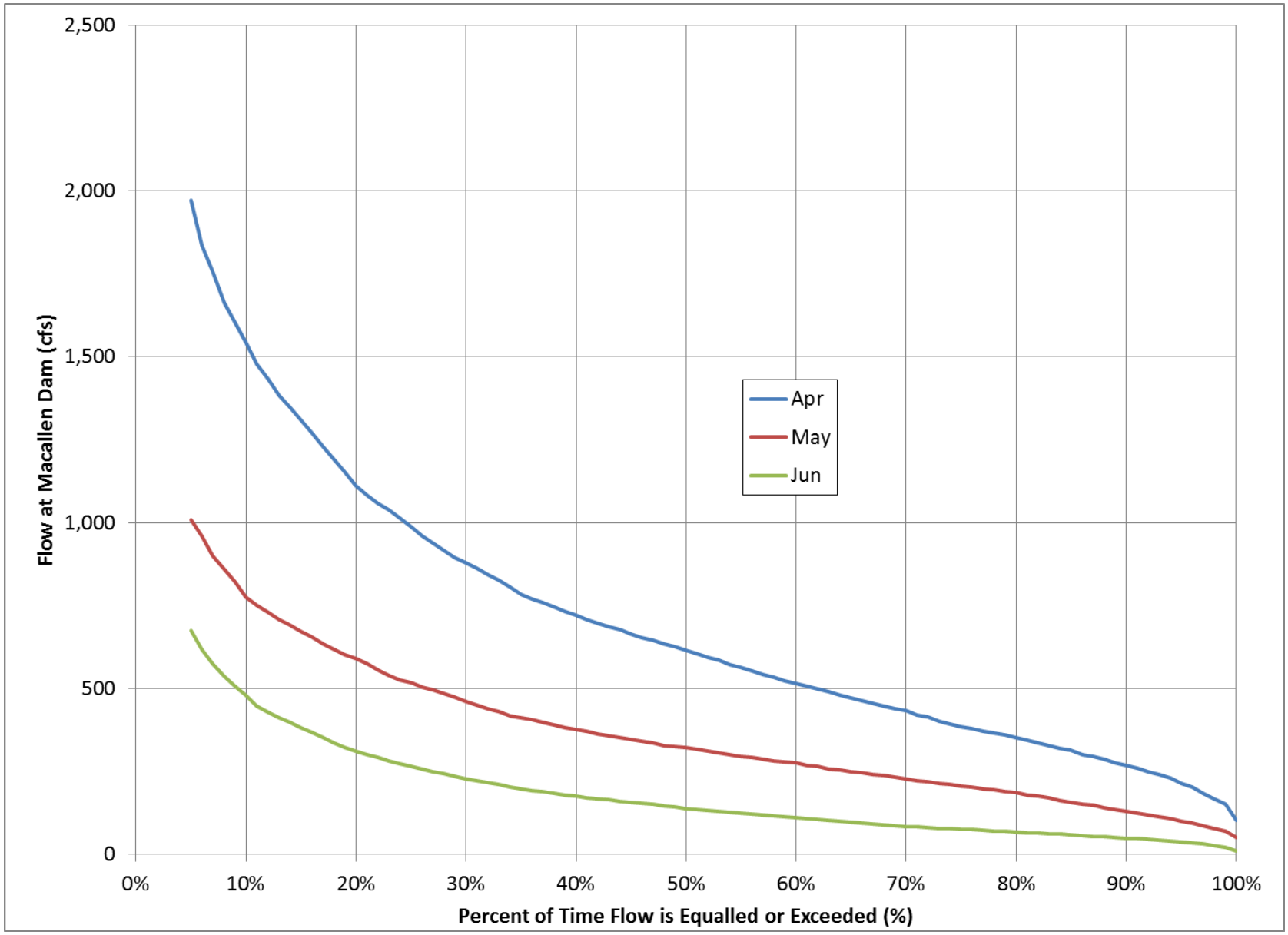

Figure 7.1-5 April, May and June Flow Duration Curves of the Lamprey River at Macallen Dam.

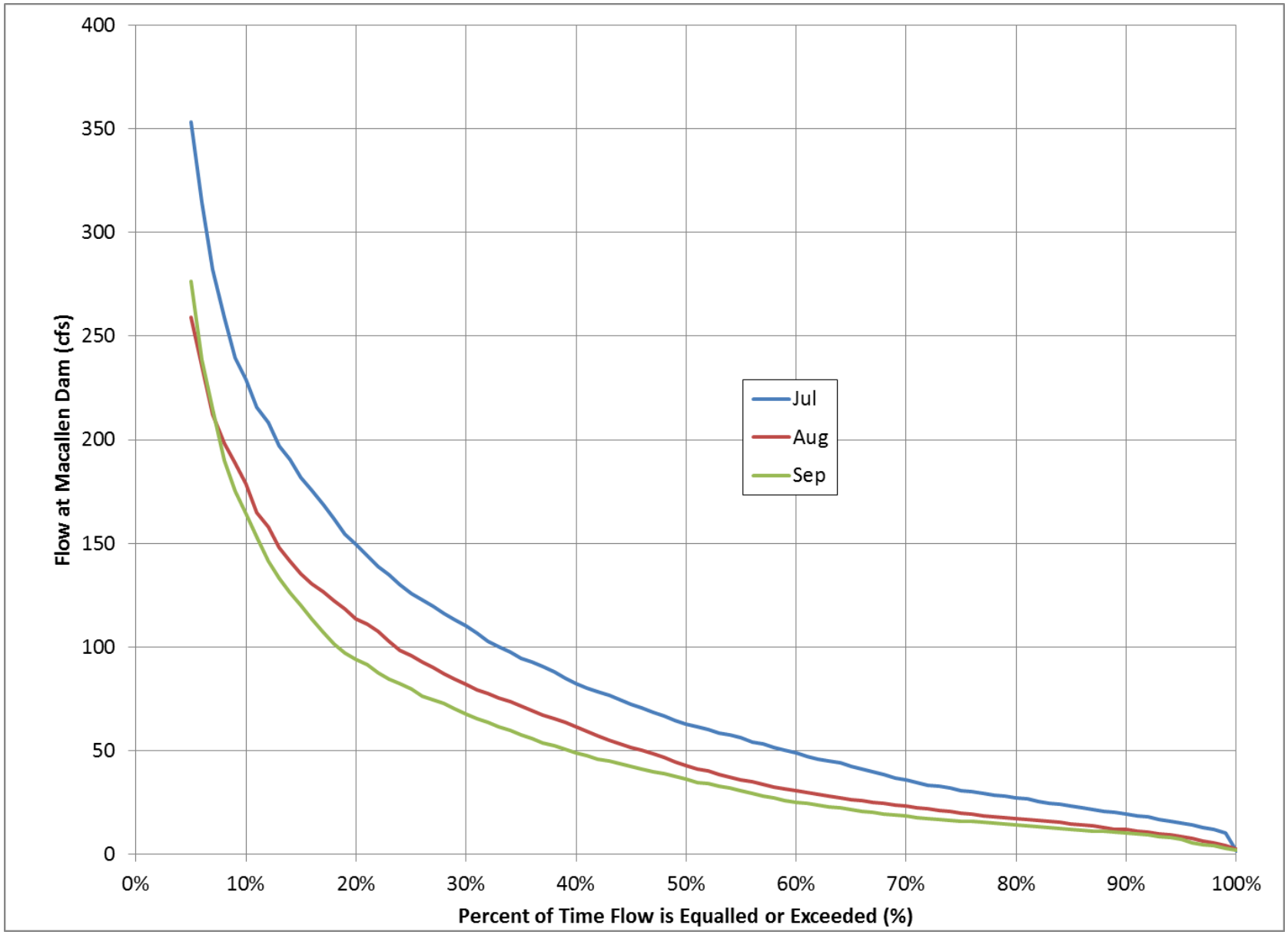

Figure 7.1-4 July, August and September Flow Duration Curves of the Lamprey River at Macallen Dam.

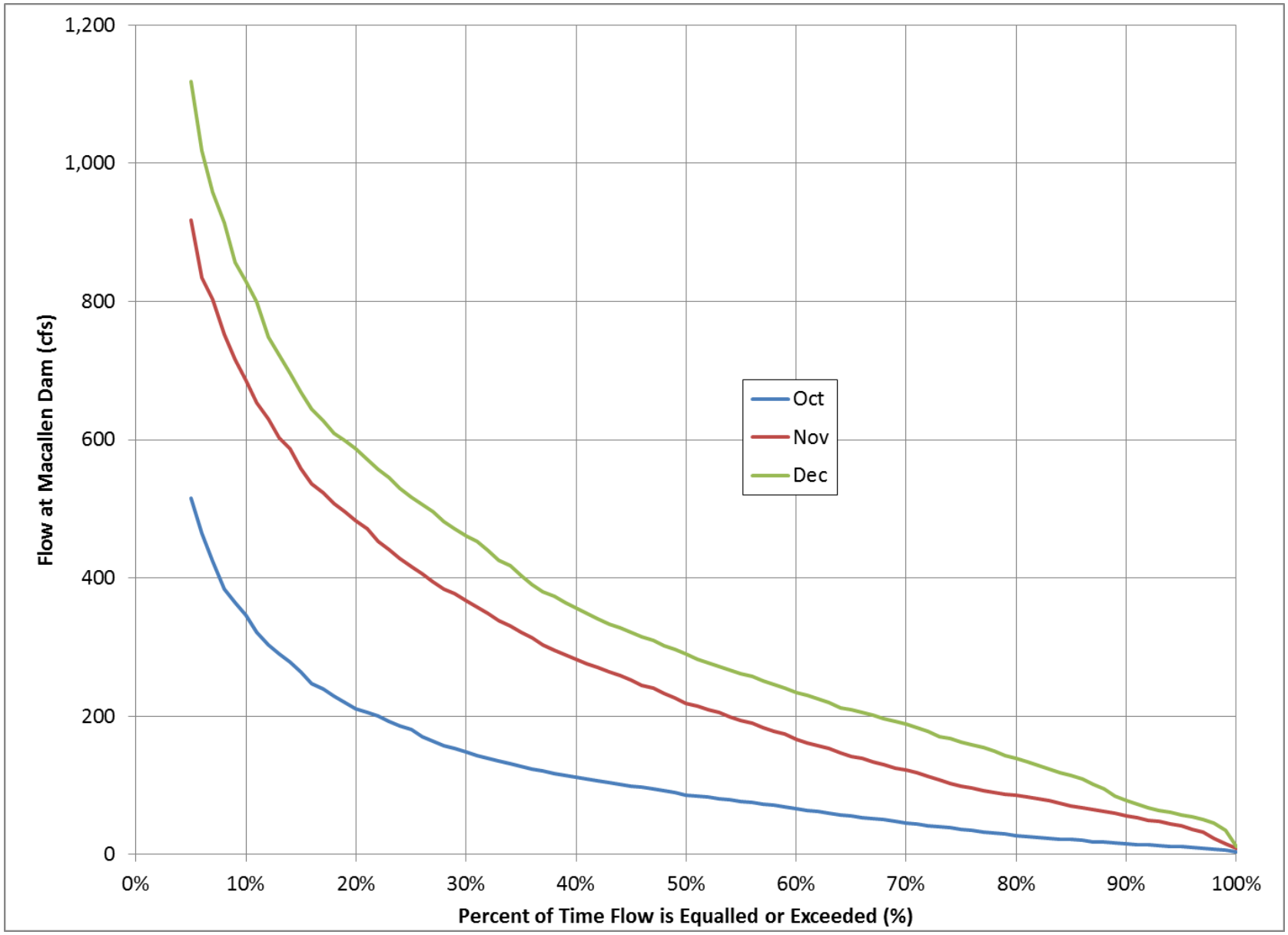

Figure 7.1-5 October, November and December Flow Duration Curves of the Lamprey River at Macallen Dam.

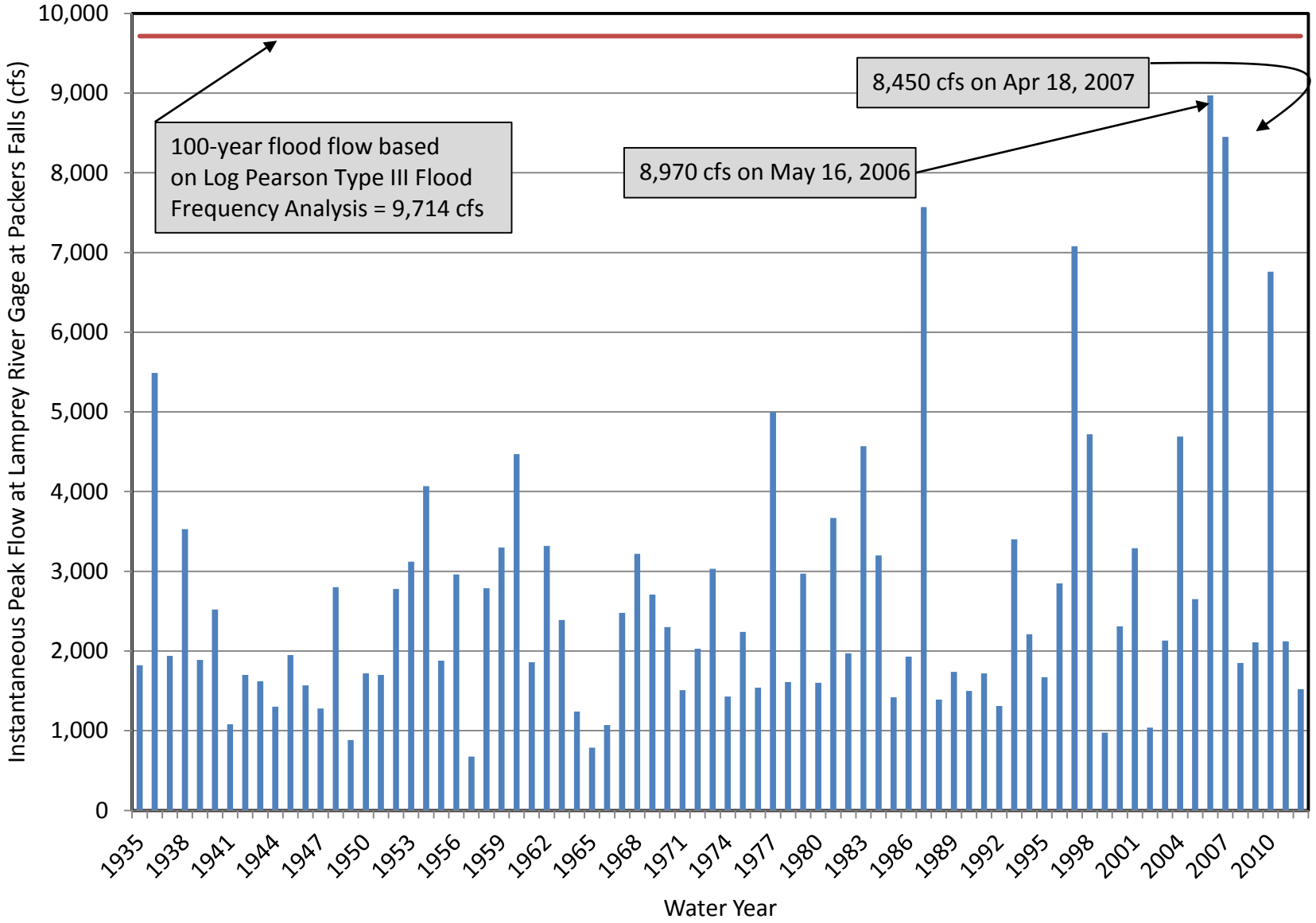

Figure 7.1-6: Instantaneous Peak Flow on the Lamprey River at Packers Falls Gage for Water Years 1935-2012.

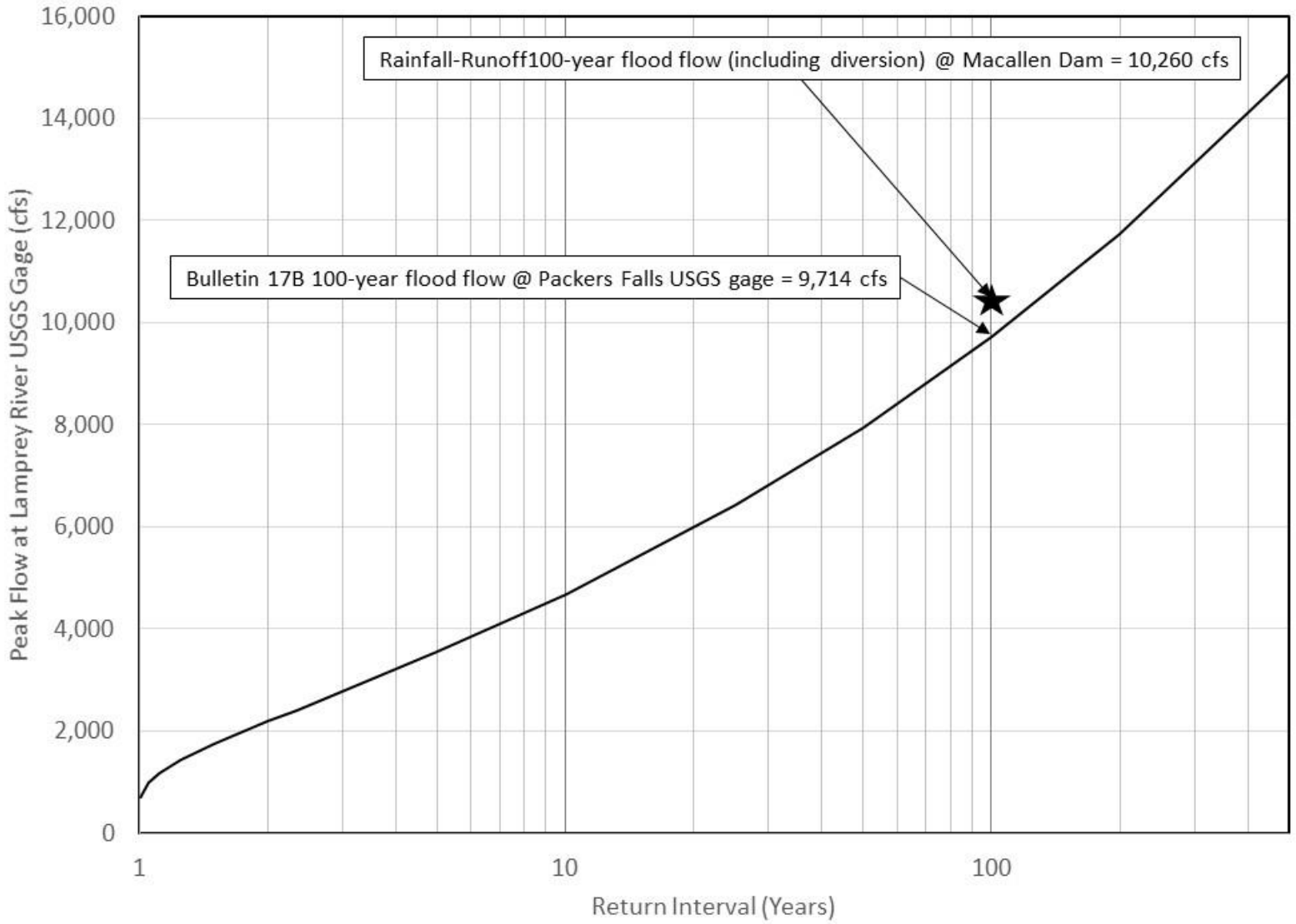

Figure 7.1-7 Flood Frequency Analysis of the Lamprey River at the USGS Gage near Packers Falls.

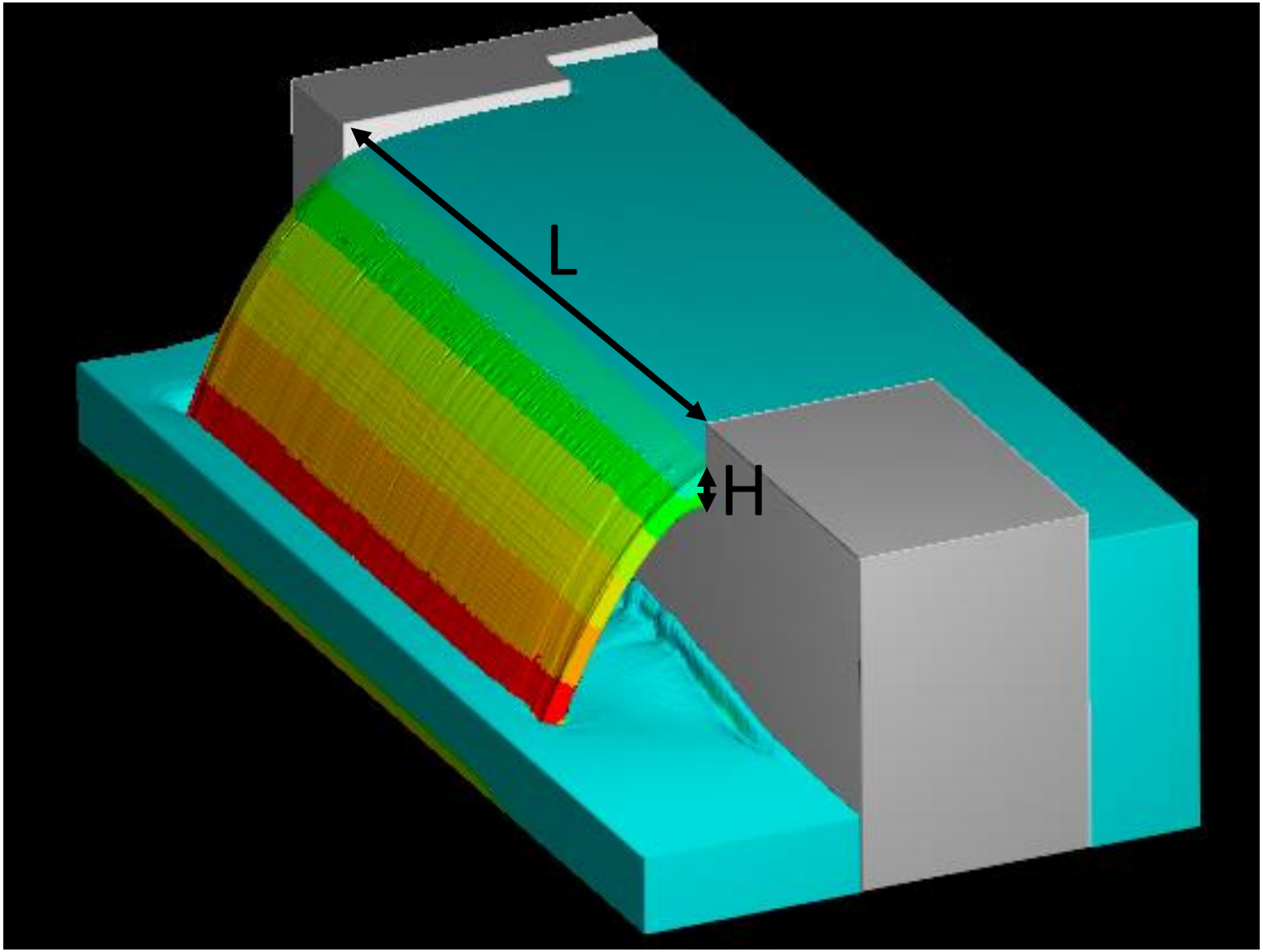

Figure 7.2.6-1: Three-dimensional representation of a broad-crested weir.

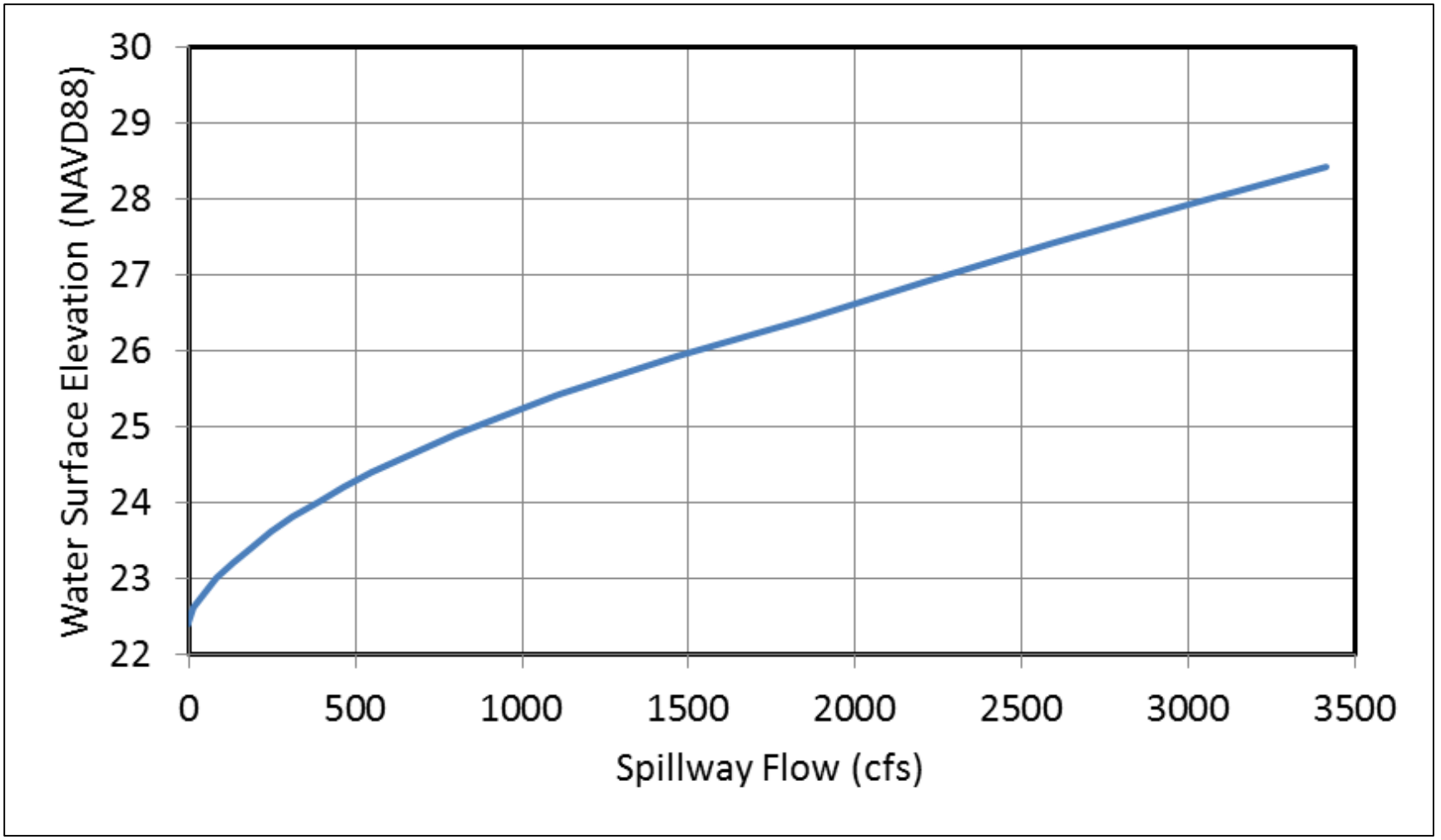

Figure 7.2.6-2: Macallen Dam spillway elevation versus flow rating curve. The spillway crest is at elevation 22.42 feet.

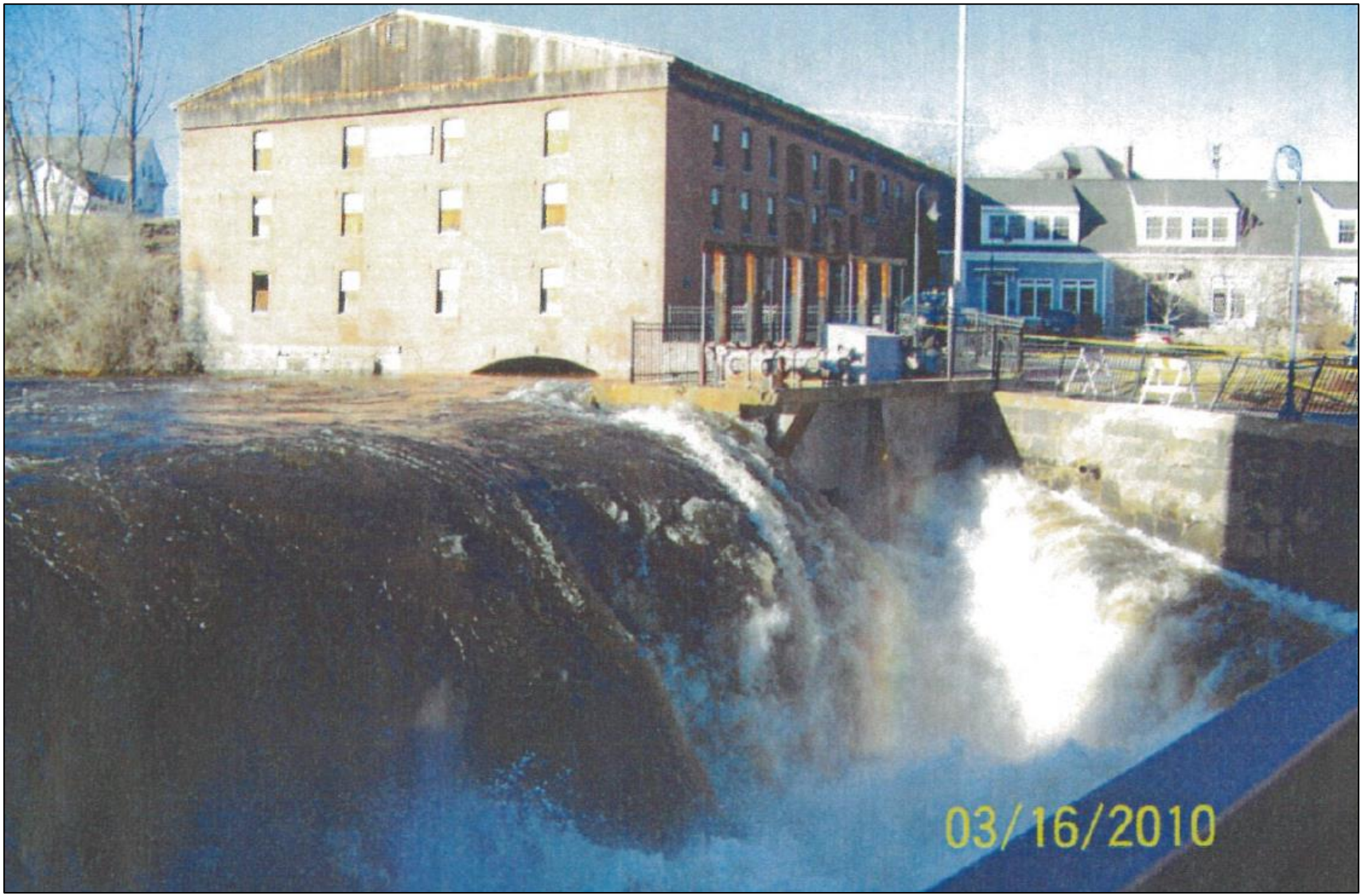

Figure 7.2.6-3: Looking upstream at the Macallen Dam spillway and left abutment during the March 2010 flood. Flow is approximately 6,710 cfs. Note backwater downstream of the gate structure due to the angled wall on river left. Photo source: NHDES Dam Bureau.

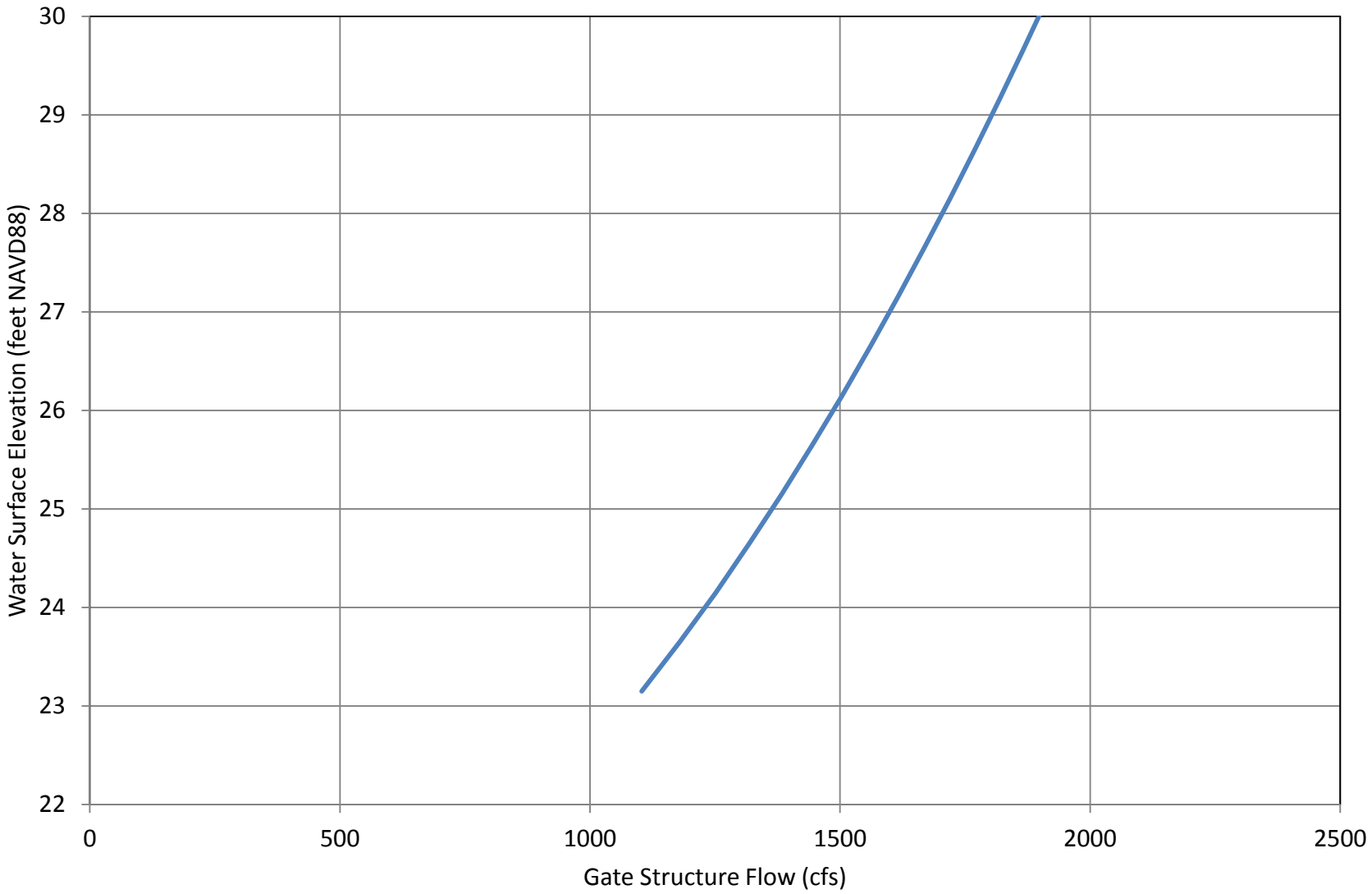

Figure 7.2.6-4: Macallen Dam crest gates elevation versus flow rating curve. Flows below the spillway crest elevation were not calculated. Calculations assume all three gates are fully open.

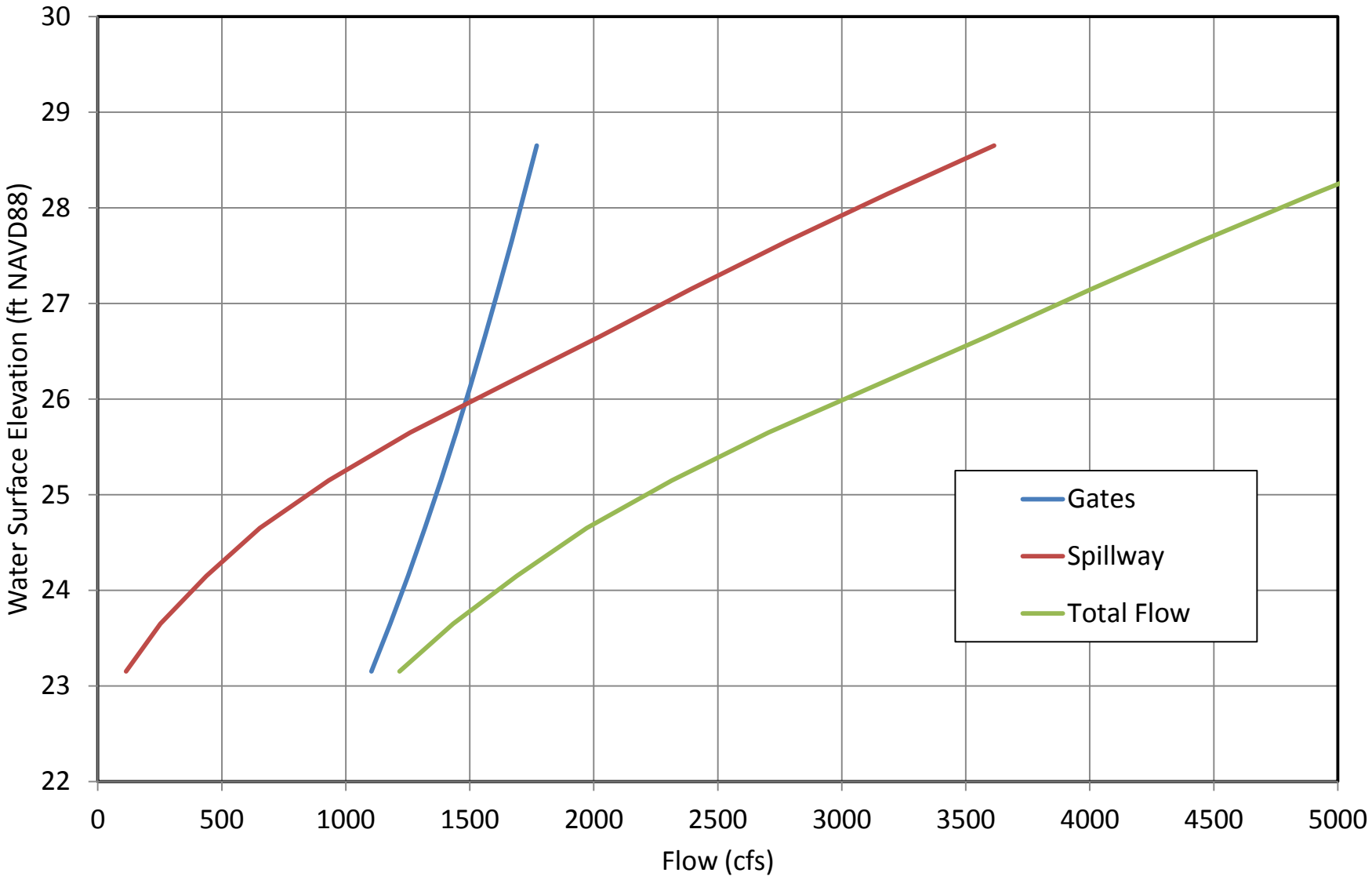

Figure 7.2.6-5: Macallen Dam water surface elevation versus discharge for the gate, spillway and total dam discharge.

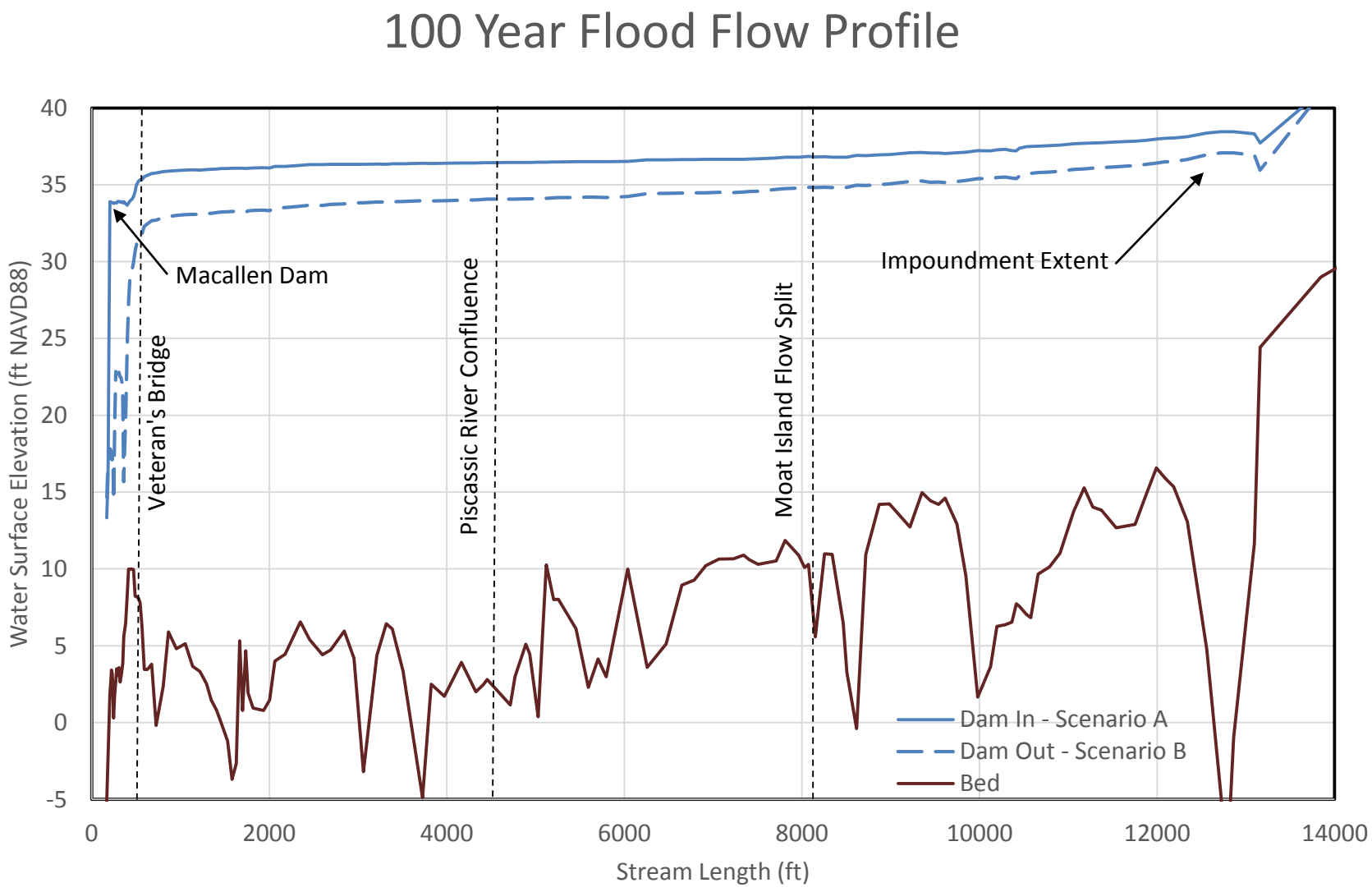

Figure 7.2.10-1: Longitudinal WSE profile for the 100-year flood flow, for Dam-In (Scenario A) and Dam-Out (Scenario B) conditions.

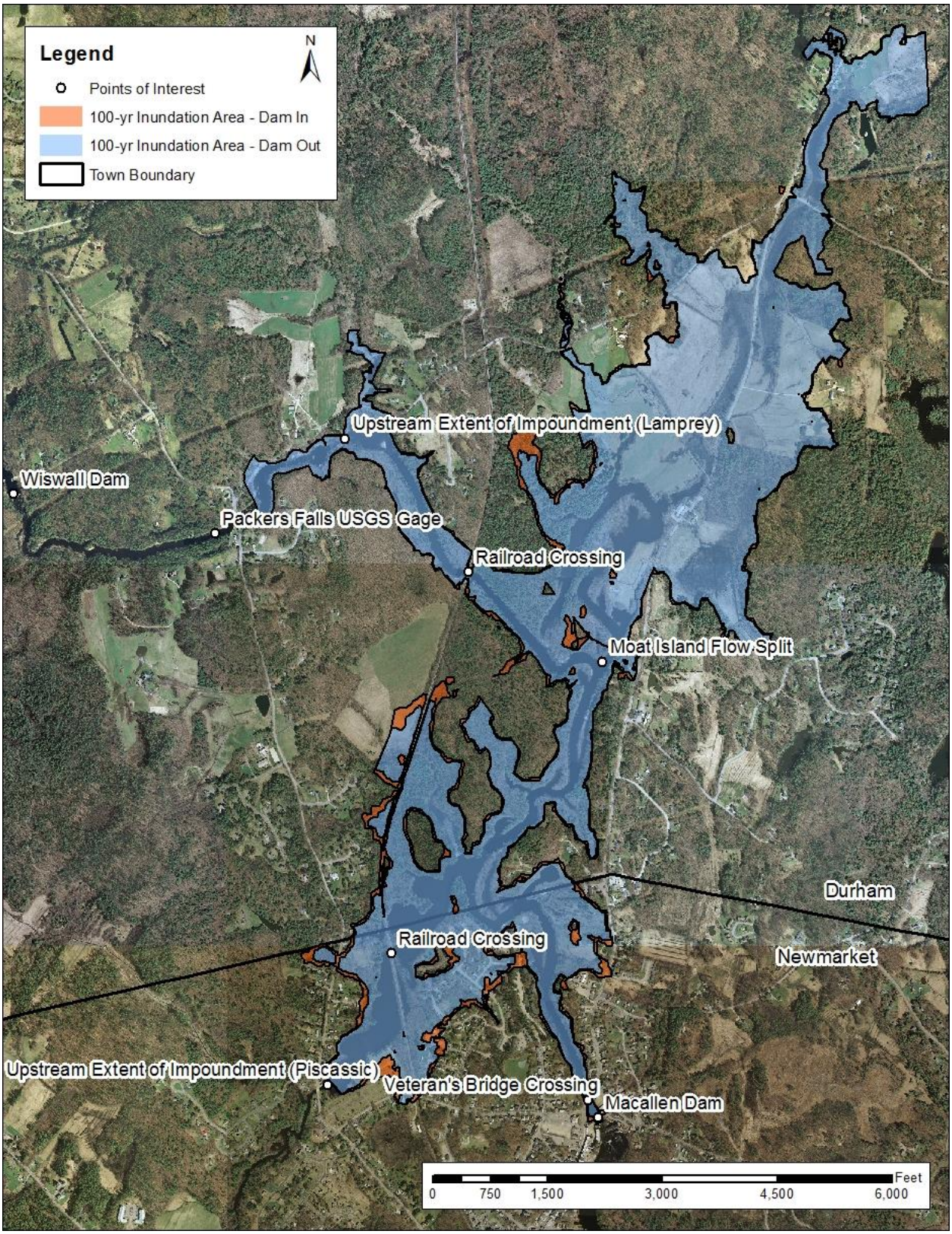

Figure 7.2.10-2: Inundation map for the 100-year flow for Dam-In (Scenario A) and Dam-Out (Scenario B) conditions.

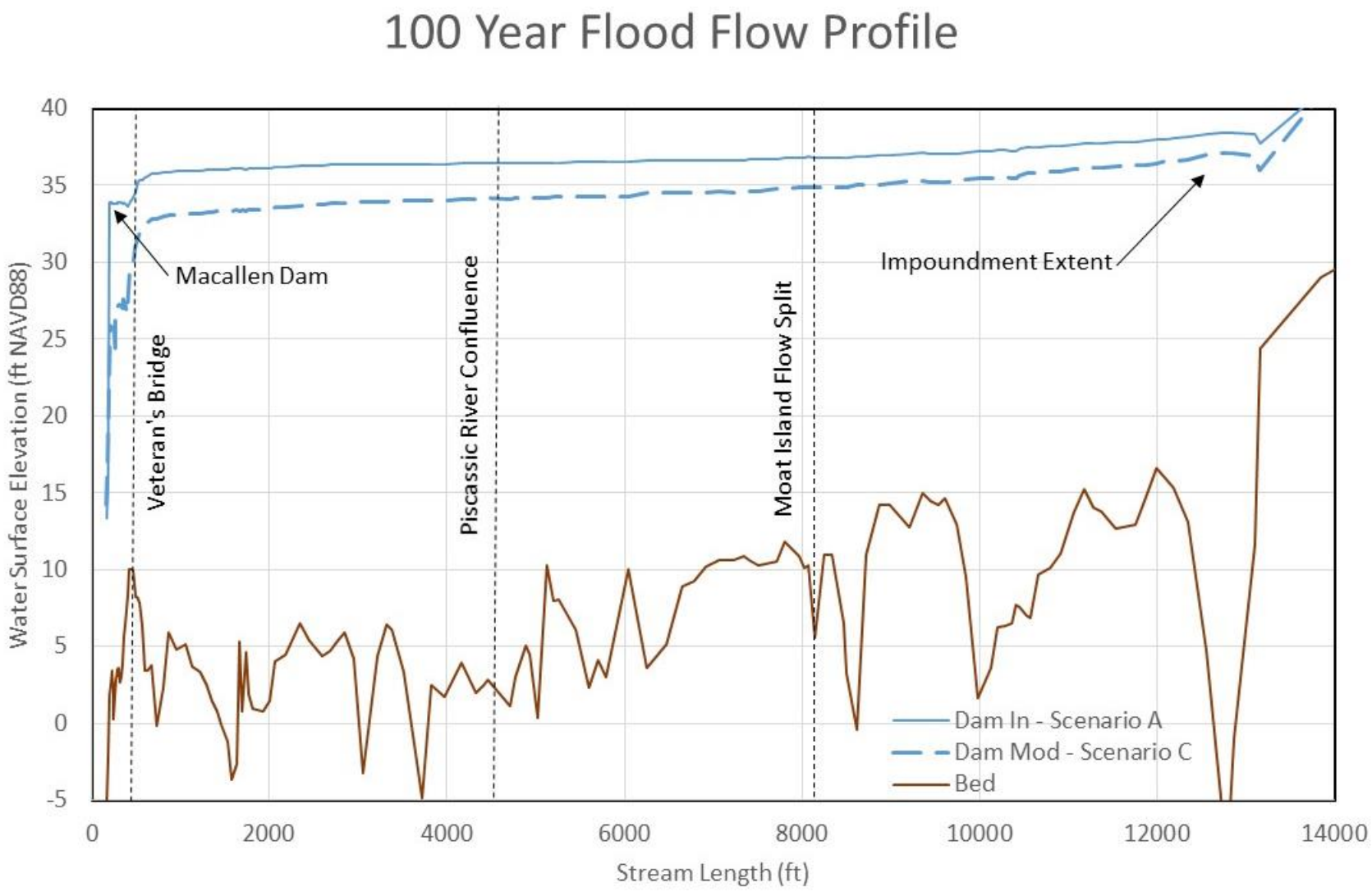

Figure 7.2.10-3: Longitudinal WSE profile for the 100-year flood flow, for Dam-In (Scenario A) and Dam-Modification (spillway lowered 10 feet, Scenario C) conditions.

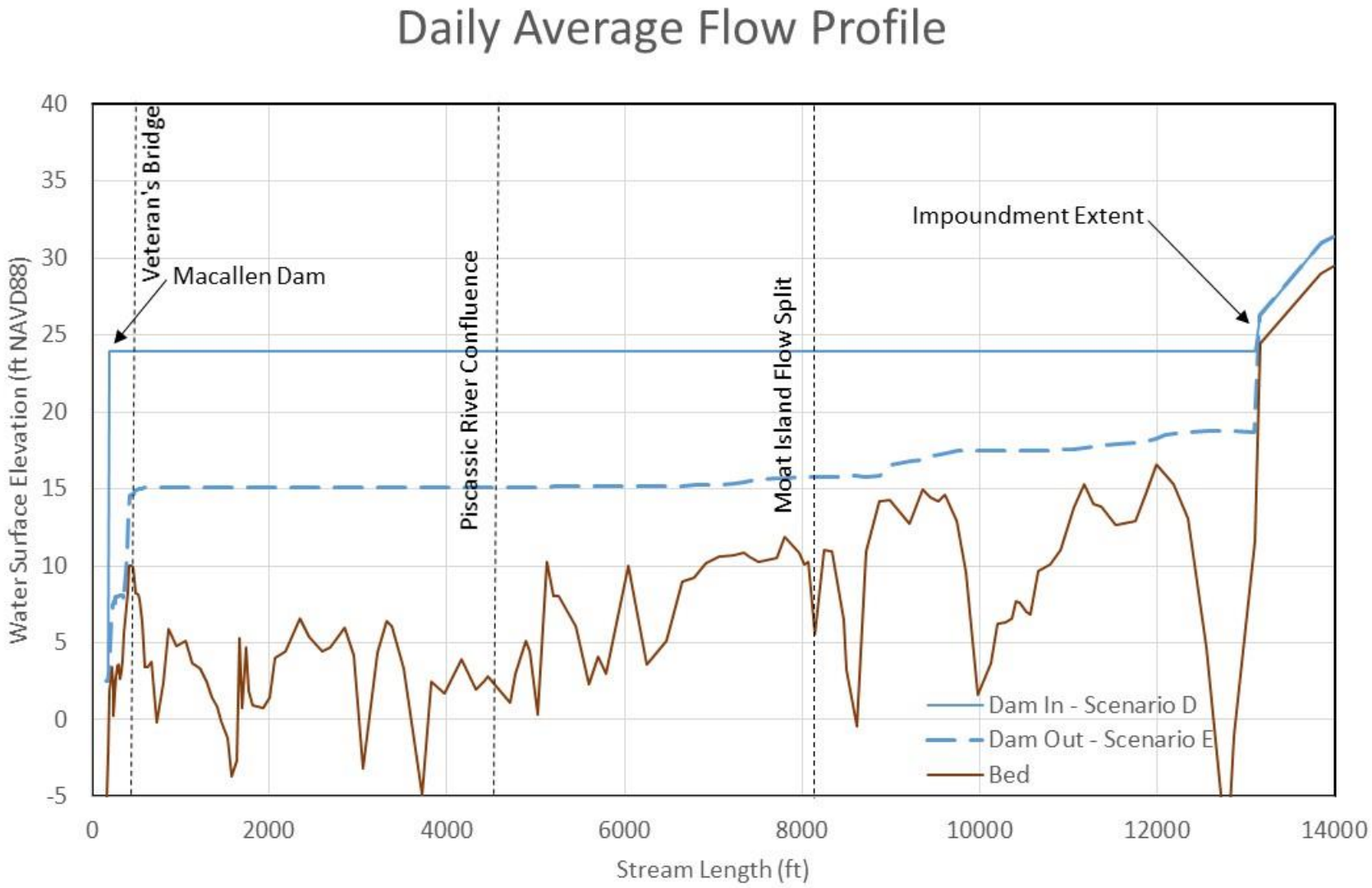

Figure 7.2.10-4: Longitudinal WSE profile for the daily average flow, for Dam-In (Scenario D) and Dam-Out (Scenario E) conditions.

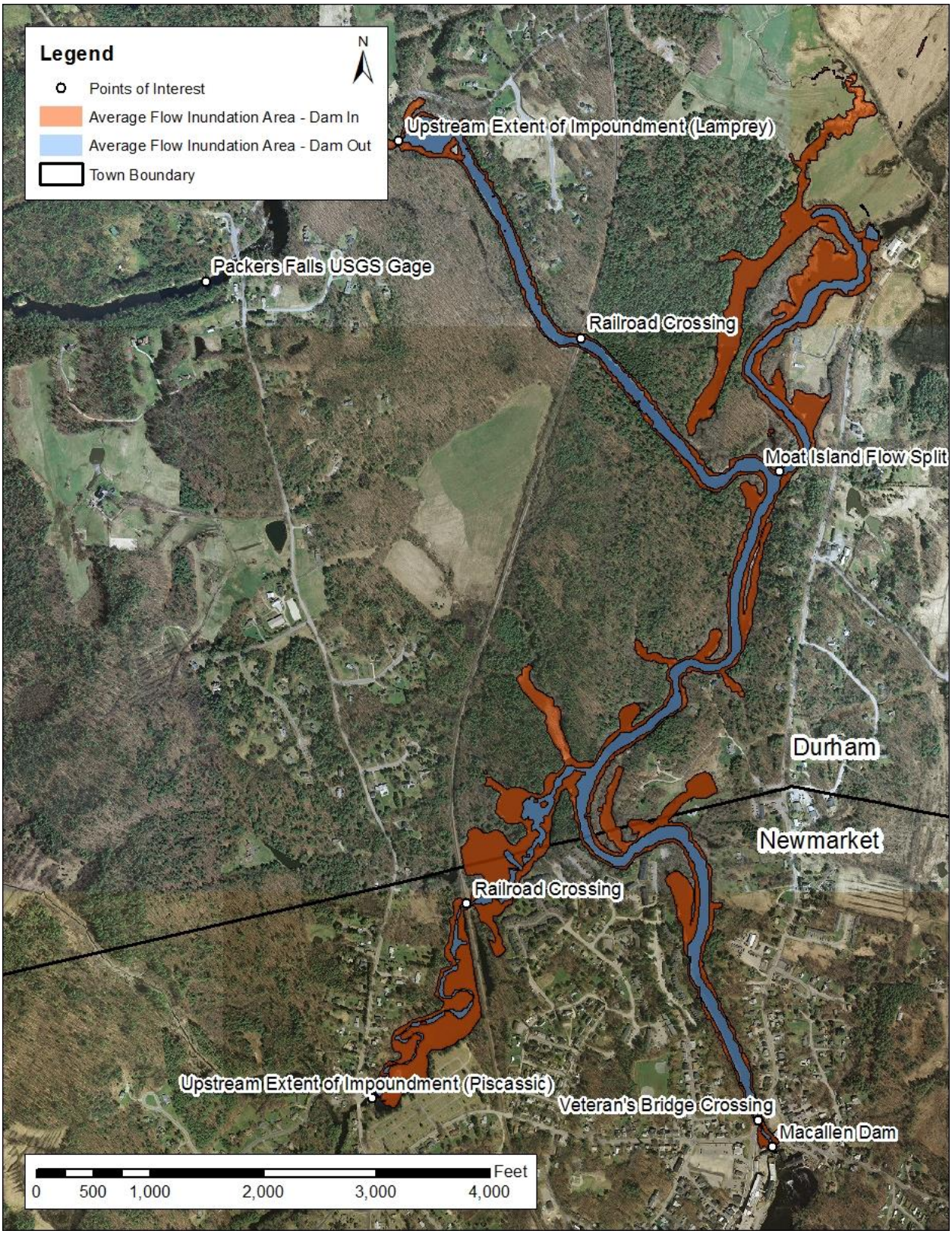

Figure 7.2.10-5: Inundation map for the daily average flow, for Dam-In (Scenario D) and Dam-Out (Scenario E) conditions.

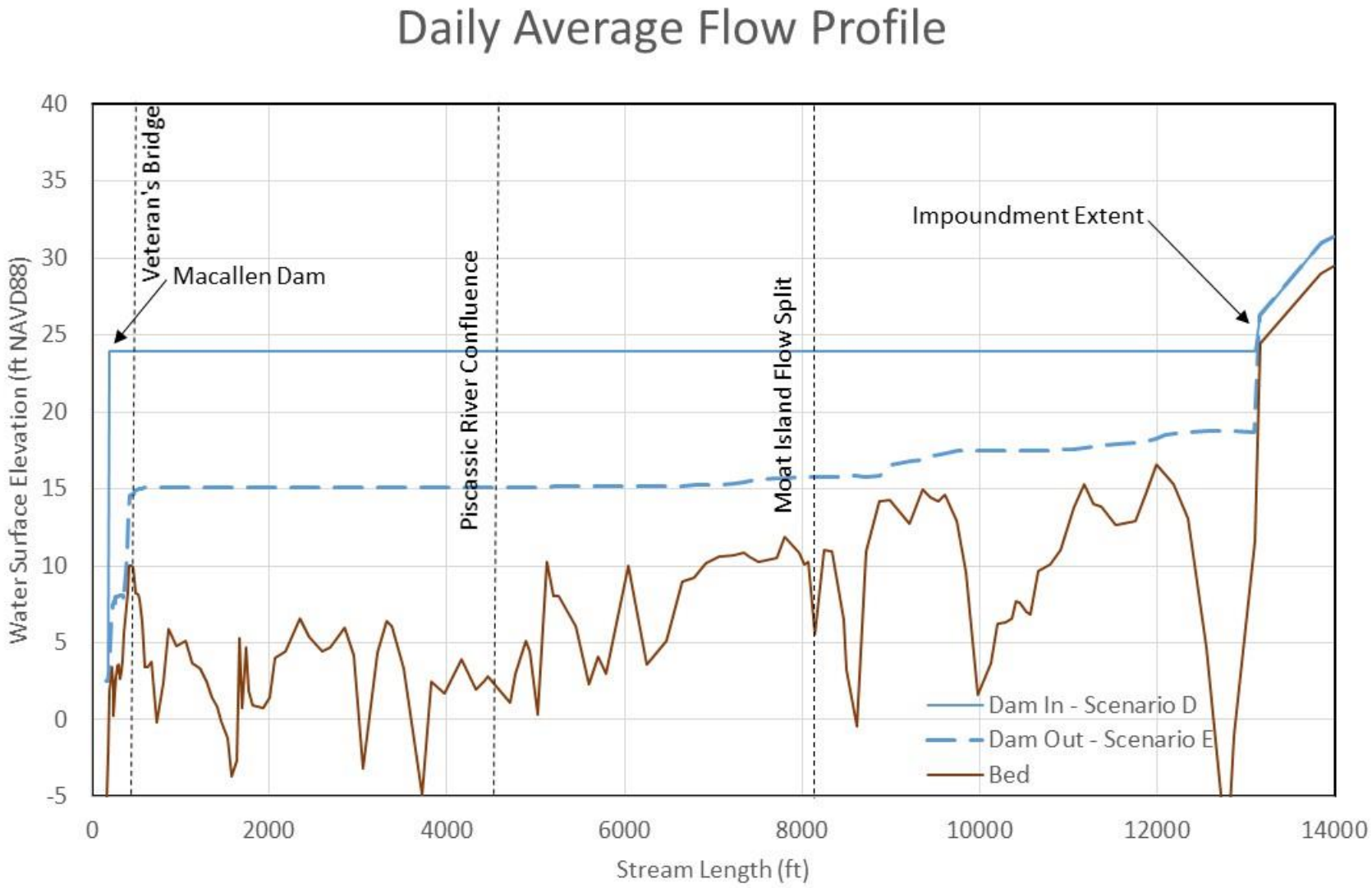

Figure 7.2.10-6: Longitudinal WSE profile for the simulated low flow, for Dam-In (Scenario F) and Dam-Out (Scenario G) conditions.

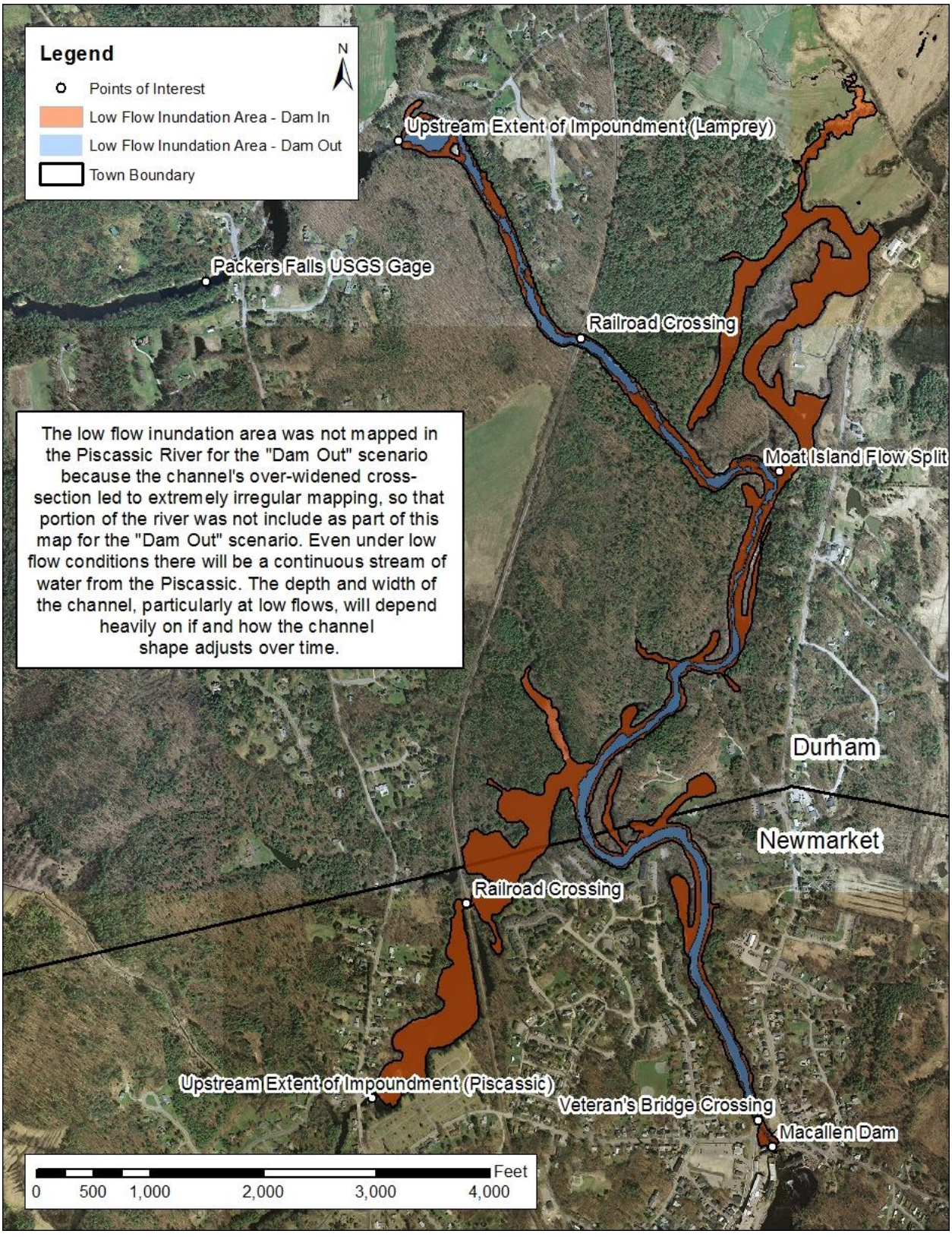

Figure 7.2.10-7: Inundation map for the simulated low flow, for Dam-In (Scenario F) and Dam-Out (Scenario G) conditions.

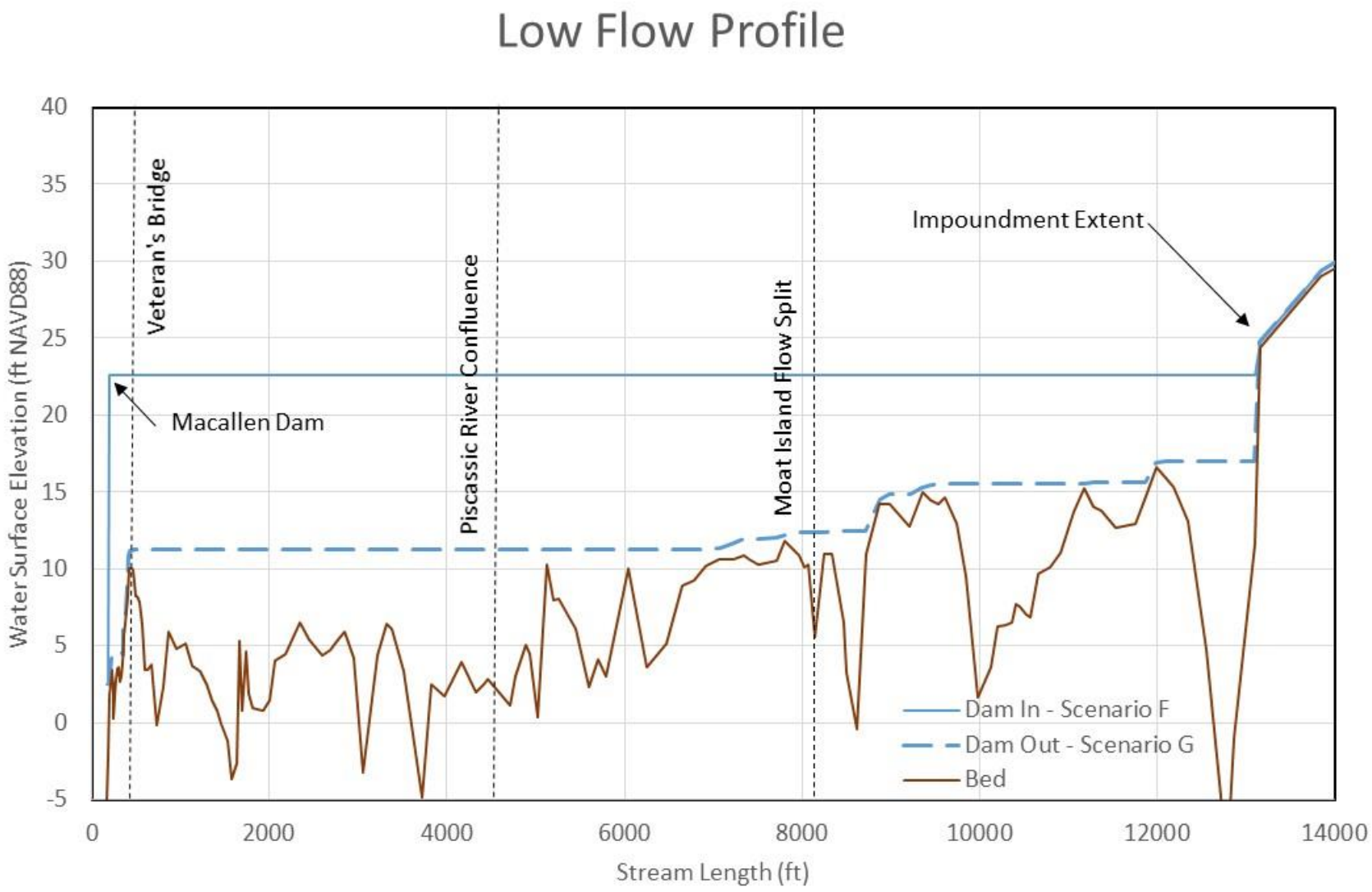

Figure 7.2.10-8: Longitudinal water velocity plot for average fish passage season flow in the vicinity of Macallen Dam, for Dam-In (Scenario F) and Dam-Out (Scenario G) conditions.

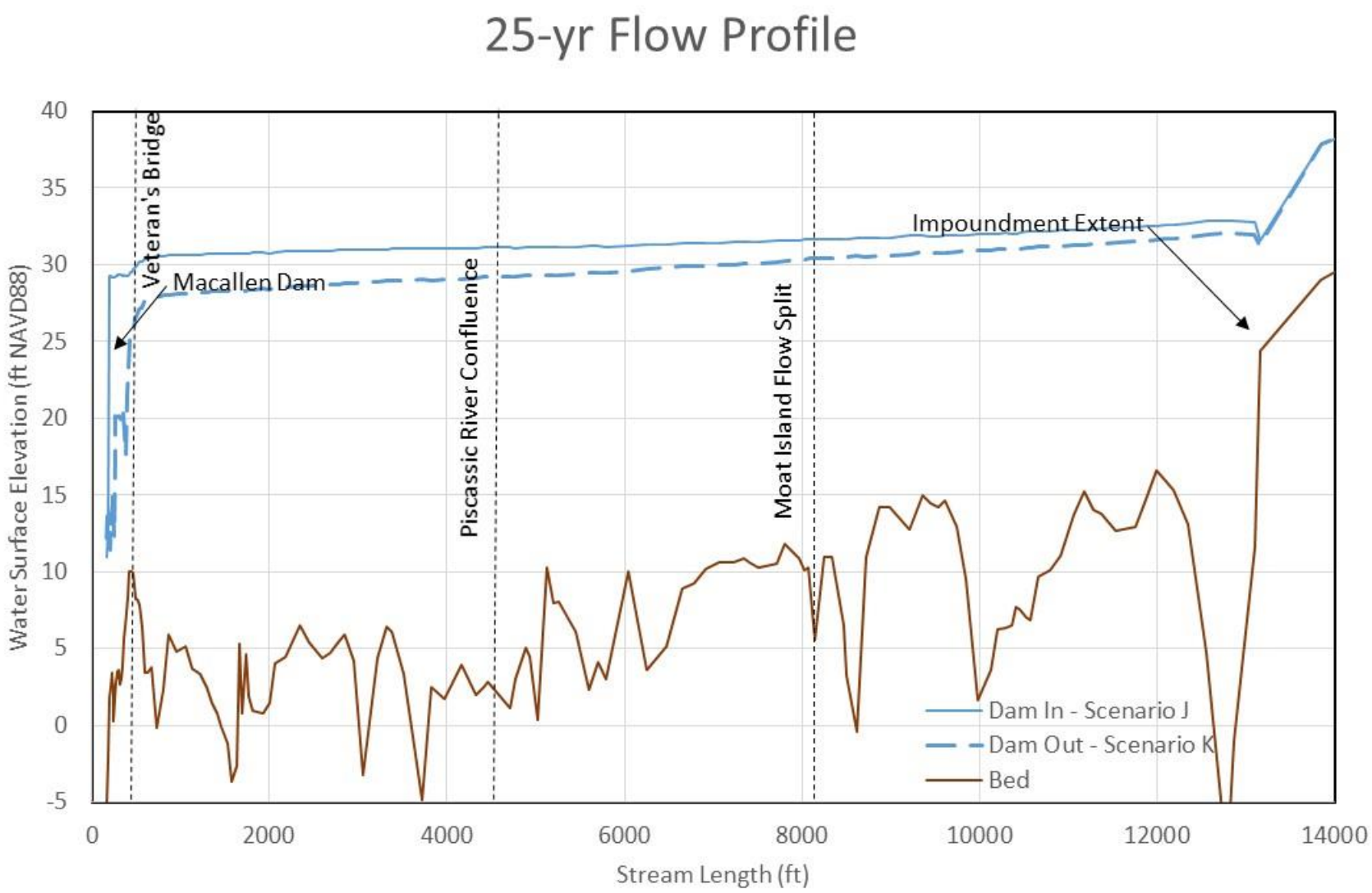

Figure 7.2.10-9: Longitudinal water velocity plot for 25-year flood flow in the vicinity of Macallen Dam, for Dam-In (Scenario J) and Dam-Out (Scenario K) conditions.

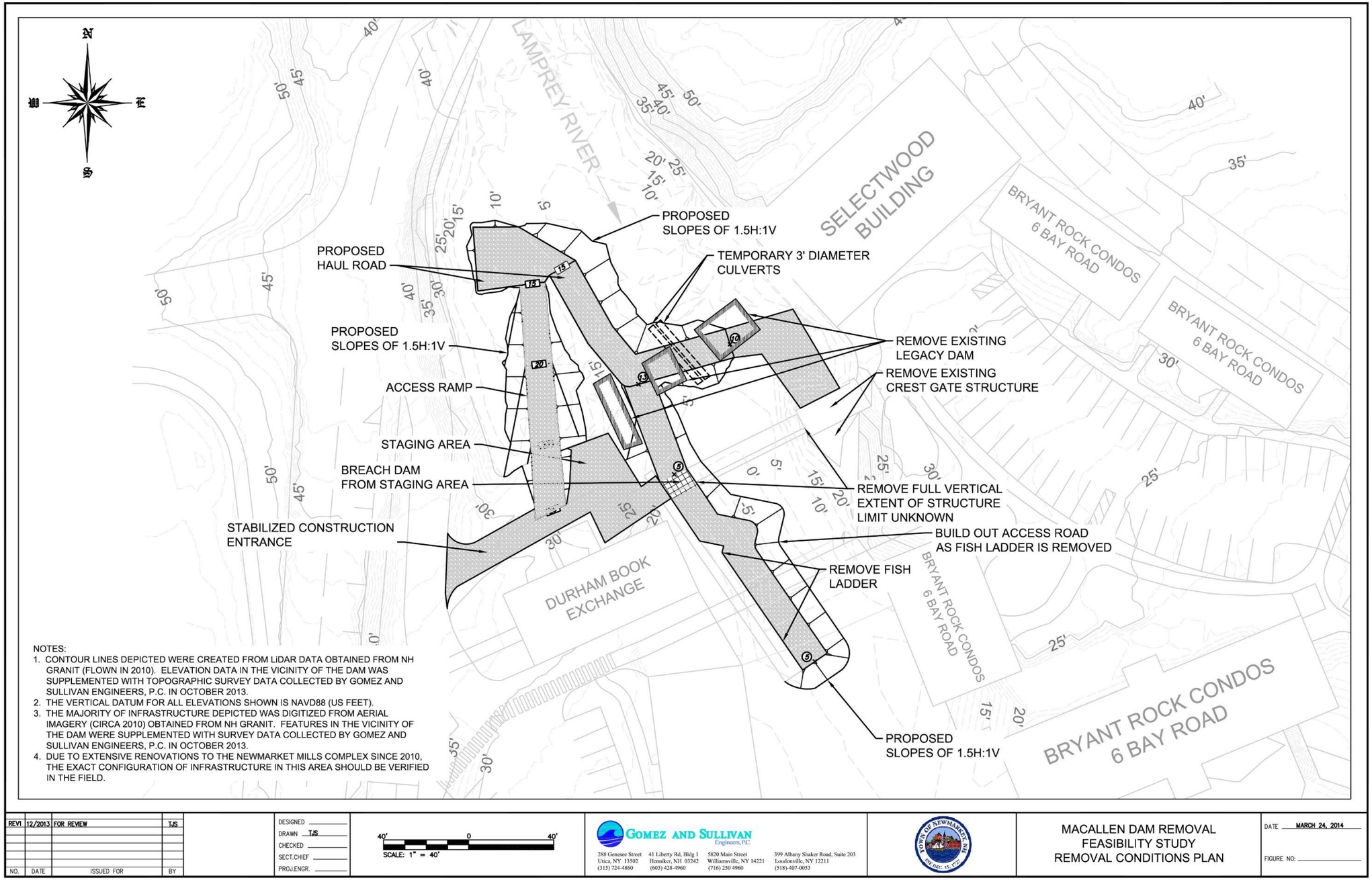

Figure 10.1-1: Conceptual Dam Removal Plan Drawing

Figure 10.1-2: Visual rendering of Macallen Dam before and after removal